TRAFVU User's Guide

Version 6.0

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Foreword

This User's Guide describes how to access and use the Microsoft Windows™ version of TRAFVU. The McTrans Center is maintaining TRAFVU.

Please refer to the TSIS User's Guide for information on obtaining TRAFVU.

Abstract

TRAFVU (TRAF Visualization Utility) is a state-of-the-art graphics post-processor for FHWA's CORSIM microscopic traffic simulation system. The Microsoft Windows™ version of TRAFVU is distributed as part of, and is designed to operate efficiently in conjunction with, FHWA's Traffic Software Integrated System (TSIS).

TRAFVU displays traffic networks, animates simulated traffic flow operations, animates and displays simulation output measures of effectiveness, and displays user-specified input parameters for simulated network objects.

This guide:

- Introduces users to the capabilities and features of TRAFVU.
- Explains in detail how to use TRAFVU and how to access all of its functionality.
- Provides a tips and troubleshooting section that describes how to optimize the network representation in TRAFVU.

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1 Introduction

1.1 Welcome to TRAFVU

This guide presents a comprehensive description of how to use the TRAFVU graphics processor. First, the guide introduces you to the capabilities afforded by TRAFVU. Next, it provides a complete description of TRAFVU's Graphical User Interface (GUI). Finally, it presents information to help you obtain the best representation of your traffic network and to assist you when you encounter problems in using TRAFVU.

This User's Guide supports traffic engineers using the Microsoft Windows™ version of TRAFVU to review and analyze simulation results. The guide describes neither the technical aspects of CORSIM, nor the types of analyses that can be performed using traffic simulations.

1.2 TRAFVU Overview

TRAFVU (TRAF Visualization Utility) is a user-friendly graphics post-processor for the Federal Highway Administration's (FHWA's) CORSIM microscopic traffic simulation system. TRAFVU displays traffic networks; animates simulated traffic, signals, and Measures of Effectiveness (MOEs); displays bus stations, bus routes and parking zones; reports attributes for links, nodes, bus routes, bus stations, and parking zones; and displays a legend describing the various elements depicted in the network display windows. TRAFVU takes full advantage of the processing power and graphics capabilities of today's computers. The expanded capability of this product (e.g., the ability to animate in multiple windows and to simultaneously process multiple cases) over previously available graphics processors provides you with an easy-to-use, yet powerful tool for conducting traffic analyses.

The Windows version of TRAFVU is distributed as part of, and executes efficiently in conjunction with, FHWA's Traffic Software Integrated System (TSIS). This version of TRAFVU is supported under the following operating systems: Windows 2000, Windows 2003 Server, and Windows XP.

TRAFVU is also deployed in FHWA's Traffic Research Laboratory (TReL). In this alternate environment, TRAFVU executes on a UNIX workstation in both simulation-concurrent and post-processing modes. Because of its cross-platform design, the same TRAFVU source code produces programs that execute under Windows on personal computers or Motif on UNIX workstations.

1.3 Documentation Structure

This User's Guide is written in a modular fashion that enables you to quickly find the information you need. This modular design also supports the on-line help mechanism provided by TRAFVU. Each section addresses a specific TRAFVU function or feature and presents a detailed discussion describing the feature, its operation, and when and how to use it.

Chapter 2 provides a detailed description of the TRAFVU graphical user interface. Chapter 3 presents network drawing tips and troubleshooting information to help solve problems you may encounter when using TRAFVU. The glossary provides definitions for the terms used in TRAFVU and the CORSIM simulation.

1.4 Definitions

This section defines important terms used throughout this guide:

Case - A single simulation for a specified traffic network as defined by its simulation input file. A case includes the simulation input file and all data files generated by the simulation during a run. Note, multiple runs of the simulation for gathering statistics is still considered part of a single case if the input has not changed.

Frame - A snapshot of the vehicles and signals on a traffic network at an instant in time. Animation is the display of consecutive frames in time. Frame spacing is nominally equal to the simulation time step. However, you can set the frame spacing to skip time steps (see Section 2.10) or to interpolate between time steps (see Section 2.9).

Time Interval - A unit of time at which the simulation model (CORSIM) reports Measures of Effectiveness (MOE).

Time Step - The smallest unit of time at which the simulation model (CORSIM) reports information. The time step is typically one second. CORSIM reports vehicle positions, signal states, and controller information at each time step.

Window - A window is a rectangular viewing area on the screen usually bordered by some type of decorative frame.

Windows™ - A registered trademark of Microsoft Corporation. When referring to the Windows operating system the word "Windows" appears with an initial capital "W".

1.5 Conventions

This section identifies symbol and type conventions used throughout this guide:

Convention	Description
`Monospace`	Text that you type at the keyboard. If the case is important the instructions specify to type the text exactly as shown.
<ENTER>	All single-key action keystrokes are in bold capital letters, offset with angled brackets.
<←>, <↑>, <→>, <↓>	Arrow keys are denoted in the same way as all other single-key action keys.
<CTRL>+<PgDn>	Combination keystrokes are separated by a plus. Press the identified keys simultaneously.
OK	Labeled GUI buttons are in bold letters. The manual refers to unlabeled buttons in ways that clearly distinguish the specific button under discussion.
C:\>	Command line prompts appear in all capitals.
File|Exit	This means click on the File menu item and then click on the Exit menu command.
File	Menu bar items have their first letter capitalized and are underlined.
filename.ext	File names are identified by bold italics.

1.6 New Features

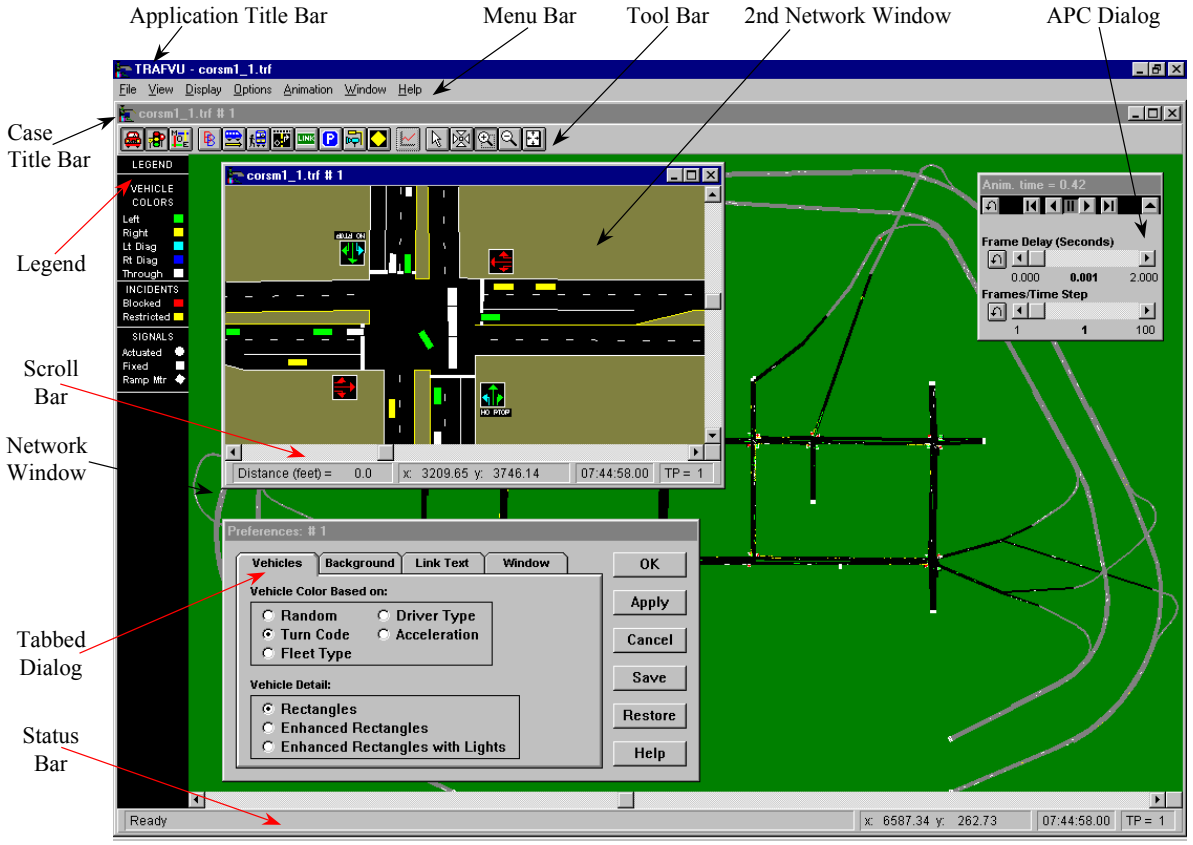
Version 6.0 of TRAFVU offers the following new features:

- **Bitmap Background.** We have modified TRAFVU to display the bitmap background used by TRAFED. When exporting the TRAFED network to a CORSIM input (***.trf***) file, TRAFED writes the bitmap information to the ***.trf*** file. TRAFVU then uses that information to display the proper bitmap in the correct location on the network map. From the Display menu and a corresponding toolbar button, you can toggle the display of the background bitmap.
- **Link Names.** We have added the display of link names to the map in TRAFVU. TRAFVU displays link names next to links that have entries on record type 10 in the ***.trf*** file. From the Display menu and a corresponding toolbar button, you can toggle the display of the link names. Using the Preferences dialog, you can control the color, size, and placement of the link names on the network map.
- **User Preferences.** TRAFVU now maintains application and window settings for a user between TRAFVU sessions. Each user can have different preference settings. Application-level preferences include: dynamic scrolling, tool tip display, and APC window settings (including size and placement). Window-level preferences include: object display button settings, vehicle color and detail properties, background color, link name settings, and window component (toolbar, legend, and status bar) display preferences.
- **Warning Sign Display.** You can now control the display of warning and HOV signs using the Warning Sign item on the Display menu or the corresponding toolbar button.
- **Entry Links.** You can now right click on an entry link to display its attributes, e.g., entry volume.
- **Zoom Capture and Set.** We have modified the Zoom Capture and Set dialog to enable you to specify the file to which window coordinates are saved or from which they are retrieved. This allows you to save multiple sets of coordinates for a single or multiple cases.
- **INV File.** TRAFVU no longer generates an ***.inv*** file when it loads a case. This allows you to load cases (***.trf*** files) from write-protected directories/drives and from CD-ROM.

2 TRAFVU Graphical User Interface

2.1 TRAFVU GUI

TRAFVU provides a point-and-click, window-based graphical user interface (GUI) that allows you to simultaneously post-process and review the results of one or more CORSIM simulations. The following figure illustrates the TRAFVU GUI and its constituent elements.



TRAFVU GUI

Elements that compose the GUI include a title bar, menu bar, tool bar, scroll bars, status bar, Animation Playback Control (APC) dialog, legend, and the TRAFVU working area with open Network windows and dialogs. After discussing some of the basic skills required to interact with TRAFVU in the Windows environment, the remainder of this chapter describes each of the GUI elements in more detail.

The following description of the TRAFVU GUI assumes that you are familiar with the general operation of Windows. For general help on using Windows, such as managing the environment, the file system and printing, please refer to the Microsoft Windows user's guides and on-line help.

2.2 Basics

You need the following skills to interact with TRAFVU in the Windows environment:

- Microsoft Windows™ is a graphical user interface (GUI) based operating system. In Windows, you interact with an application (a program) primarily through the use of graphical objects. These objects are windows, dialogs, icons, buttons, and menus.
- You interact with the GUI primarily by moving a mouse, which in turn moves a cursor on the screen. The cursor is typically shaped like an arrow or a capital "I", depending on where it is in a window (or dialog). There are times when the cursor takes on other shapes. These shapes represent different processing states within Windows.
- You activate a button or access a menu command by pressing the left button of the mouse. This is a single click.
- Some interactions require a double click. This requires you to press the left mouse button twice in rapid succession.
- You highlight or select text by holding the left mouse button down while dragging the cursor across the text.
- After you have specified information or selected items in a dialog, press the **OK** or **Apply** button to save the information. Pressing the **OK** button closes the dialog while pressing the **Apply** button leaves the dialog open. Press the **Cancel** button to close a dialog without saving pending changes. Some dialogs have tabs that contain different information. To access the information on a particular tab, click on that tab. The **OK**, **Apply**, and **Cancel** buttons operate on all tabs within the dialog.
- The **F1** key invokes context sensitive help for a window, dialog, or highlighted control.

2.3 Workspace

The TRAFVU workspace supports multiple simultaneous Network windows. The active Network window is the window with the highlighted title bar. In general, menu commands and accelerator keys affect only the active window. However, there are a few commands that affect multiple windows or the entire application. The documentation clearly identifies those commands that affect more than one window. When several Network windows are open, activating a Network window is simply a matter of clicking the left mouse button anywhere in the desired window.

You can print any diagrams displayed in a Network window. To send the contents of the window to the printer, select the File|Print menu command. TRAFVU also allows you to select/change the printer settings under the File|Print Setup menu item and customize printing through the File|Page Setup menu item.

2.4 Multiple Case Processing

TRAFVU can simultaneously display and animate multiple simulation cases. Each case manages its own set of Network windows. Additionally, TRAFVU provides you with great flexibility in adjusting the displayed simulation time for each

case. The amount of available computer resources dictates the number of simultaneous cases the software can effectively display and animate. However, most platforms can comfortably support the animation of two cases.

2.5 Network Window

A Network window (illustrated in the following figure) contains a title bar, scroll bars, status bar, menu bar, tool bar, legend, and a network image. This image may contain surface-street links (displayed in black), freeway and ramp links (displayed in gray), nodes, and source/sink locations displayed on a solid color background. Additionally, you can specify a bitmap to be displayed in the background. You can further customize this image by using the tool bar buttons or the menu bar options to view bus stations, bus routes, lane markings, parking zones, sensors, signals, and vehicles. You can zoom the image to higher/lower levels of magnification and can access information about objects within the network through mouse operations. TRAFVU does not limit the number of Network windows you can open. You may display a different portion of the entire network in each and customize each differently.

Network Window

2.5.1 Title Bar

The Network window title bar identifies the case it represents. After you open a case, the title bar displays the name of the simulation input file that defines the case and the document ID of the case.

2.5.2 Scroll Bars

The vertical and horizontal scroll bars at the right and bottom edges of the Network window provide an alternate means of panning the window. Moving the vertical scroll bar, up or down, changes the center of the Network window in the

vertical direction. Moving the horizontal scroll bar left or right changes the center of the Network window in the horizontal direction.

2.5.3 Status Bar

Each Network window contains its own status bar. The status bar displays the current time and time period of the simulation as well as the x, y position of the mouse cursor on the network map, in map coordinates (e.g., feet). The lower left corner of the map defines the origin of the map. If you press the left mouse button and drag the mouse, the status bar displays the distance (in map units) from the point at which you pressed the left mouse button to the current mouse position. As you position the mouse over a button in the tool bar, the status bar displays a brief description about the functionality of the button.

2.5.4 Background

Using the Window Preferences dialog, you can specify the color of the Network window background. If desired, you can use a different color for each Network window. Additionally, you may specify a bitmap to be displayed in the background, i.e., behind the roadways and all other network features. However, at this time only one bitmap can be used for all Network windows in a case. You may toggle the display of the bitmap using a toolbar button or the appropriate item from the Display menu for each of the Network windows. When the bitmap is hidden, the background is set to the solid color you have previously specified for the window.

Bitmap information used by TRAFVU is obtained from the ***.trf*** file that defines the case. Unlike the other network information stored in the ***.trf*** file, the bitmap information is in XML format, and is located after the final 210 record in the file. You may use TRAFED to provide the bitmap information or you may manually enter it into the ***.trf*** file. Please refer to the TRAFED User's Guide for instructions regarding the specification of bitmaps using TRAFED. The following instructions provide guidance on manually entering the bitmap information into the ***.trf*** file.

As stated, the bitmap information is stored in XML format, using XML document and data tags. It is important to use the tags as specified in the following example. To specify a bitmap to be used as a background in TRAFVU, include the following lines in the desired ***.trf*** file.

<AdditionalData>
<BitmapBackgroundPath>***C:\TSIS Projects\CORSIM City\background.bmp***</BitmapBackgroundPath>
<BitmapBackgroundBounds><MinX>***1573***</MinX><MinY>***1610***</MinY><MaxX>***14813***</MaxX><MaxY>***14850***</
MaxY></BitmapBackgroundBounds>
</AdditionalData>

The <AdditionalData> and </AdditionalData> start and end tags identify the block of data used to specify the bitmap background. The <BitmapBackgroundPath> and </BitmapBackgroundPath> tags are used to specify the path and name of the file that contains the bitmap. Place the path and name of the desired bitmap file between these tags. When specifying the path, you can specify an absolute path, as illustrated in the example, or you can specify a relative path. Relative paths are relative to the location of the ***.trf*** input file. The <BitmapBackgroundBounds> and </BitmapBackgroundBounds> tags are used to specify the bounds of the bitmap in network map coordinates (e.g., feet). This provides proper registration of the bitmap with the network. The bounds are specified using the minimum and maximum X and Y coordinates represented in the bitmap, each set off by the appropriate tags, e.g., <MinX> and </MinX>. Use of these tags is illustrated in the provided example.

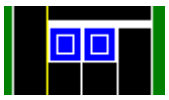
2.5.5 Mouse Cursors

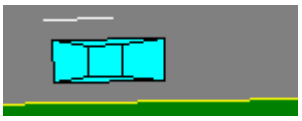
The TRAFVU application supports four different mouse cursors, each indicating a distinct operational state within the application. These operational states include: object selection, zooming, and panning. You can select a cursor either from the View pull-down menu or via a button on the tool bar. The following table illustrates each of the cursor shapes and associates the shape with its corresponding operational state.

CURSOR SHAPE	OPERATION
	Object Selection: In this state, you can select objects and display attributes for objects in the map view.
	Zoom In: In this state, you can zoom in on selected areas of the map.
	Zoom Out: In this state, you can reduce the zoom level of the map view.
	Pan-to-Center: In this state, you can pan the map view to the location of the cursor.

2.5.6 Selectable Objects

Links, nodes, vehicles, incidents, signal heads, bus stations, bus routes, sensors, parking zones, source/sink locations, and warning signs are all selectable objects, and you may access their data using a single click of the right mouse button on the object. When you click the right mouse button on one of these objects, TRAFVU displays a menu that allows you to select and display various subsets of the data available for the selected object. In addition to links and nodes, the following TRAFVU objects are selectable:

GRAPHIC SYMBOL	OBJECT DEFINITION
	Source/Sink: This represents a mid-block traffic generator or destination. Examples include shopping centers and office complexes.
	Parking Zone: This represents curb parking activity that can impede moving vehicles. Parking activity occurs in lane 1 (curb lane) if a link is part of a two-way street. If the link represents a one-way street, parking activity can occur in both outside lanes. Click on the sign at the beginning of the zone to view information about parking.
	Protected Bus Station: A bus station with its own pull-out lane where buses (un)load passengers.
	Unprotected Bus Station: A bus station adjacent to lane 1 (curb lane) where buses (un)load passengers.
	Bus Route: A path with a unique series of bus stations at which a bus stops. It is possible for two bus routes to have the same path but different stations. Bus paths are always shown in lane 1.
	**Sensor**: A sensor collects traffic data and includes both surveillance sensors and actuated control detectors.

GRAPHIC SYMBOL	OBJECT DEFINITION
	Fixed-Time Signal: A signal that is controlled on a fixed-time cycle.
	Actuated Signal: A signal that is controlled by actuations of its associated detectors.
	Ramp Meter: A signal that controls the flow of traffic onto a freeway.
	Warning Sign: These symbols generally indicate the position at which vehicles begins to respond to a specific roadway event, e.g., lane drop, HOV lane, or incident.
	Freeway Incident: Freeway incidents are events that affect the flow of traffic in one or more lanes, e.g., accidents or work zones. Click on the Maltese cross symbol to view information about the incident.
	Surface Street Event: Surface street events (long-term, short-term, parking) affect the flow of traffic in a lane, e.g., due to accidents or parking.
	**Vehicle**: Click on passenger cars, trucks or buses to obtain current information about the state of the vehicle.

2.5.7 Mouse Operations on Selectable Objects

This section describes the TRAFVU selection mode mouse operations. Selection is the process of clicking on an object to highlight it and place it on a selection list. By selecting nodes, you can display node IDs directly on the network map. By selecting links you can display link data for the selected set in tables and graphs. In the current version, graphs and tables are produced for links only. The mouse is also used to view attributes (properties) for selectable objects.

Single Click, Left button: This operation selects a single object. All other objects are deselected.

<SHIFT> + Single Click, Left button: This operation selects all objects of the chosen type and deselects all other objects. For example, clicking on one freeway link selects all freeway links and deselects all other types of objects.

<CTRL> + Single Click, Left button: This operation selects (deselects) an individual object and adds (deletes) it to (from) the set of selected objects of the same type. This is useful for selecting multiple links in order to view their data in tables and graphs. If no objects are selected or if you click on an object that is a different type than currently selected objects, this operation behaves like a single click on the left button.

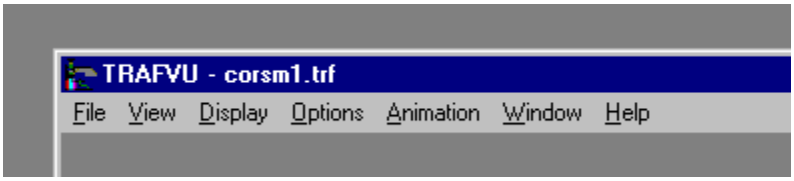
Single Click, Right button: This operation opens an Attribute menu or specialized displays depending on the type of object you select. See the Attributes section for more information on viewing object attributes.

2.6 Menu Bar

A user familiar with Windows conventions will find TRAFVU intuitive, and will easily navigate the TRAFVU menus to open cases and graphically display/animate simulation results. TRAFVU enables available menu items and disables unavailable menu items as appropriate during a session. For example, if no cases are open, a reduced (application) menu is provided that allows you to open a case, invoke TRAFVU help, or exit TRAFVU.

Application Menu Bar

When a case is open, an expanded (Network window) menu is available. You can select any menu item by clicking on the item or by pressing the <ALT> key and then pressing the underscored character in the menu item name. Once the drop-down list of menu commands appears, you can select a command by clicking on the command or by pressing the underscored character in the menu command name.

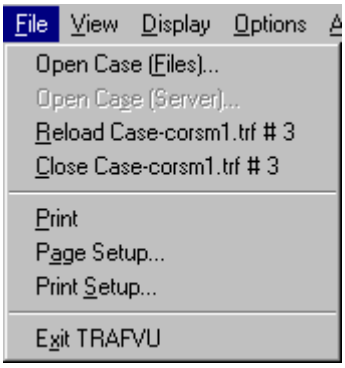


Network Window Menu Bar

NOTE: The menu bar always applies its actions to the window with focus (typical of Windows applications). The window with focus is the window with the highlighted title bar. Be sure to click in the window you want to operate on prior to selecting a menu command. This sets the focus of commands to that window.

2.6.1 File

The File menu allows you to open and close cases, access print operations, and exit TRAFVU. It contains the following commands:



Open Case (Files)…: Invokes the Open Case dialog. Via this dialog you select the CORSIM simulation that you wish to post-process.

Open Case (Server)…: This command is for use with remote socket connections. This option is currently available for UNIX systems only.

Reload Case - case name: Reloads the currently open case that has focus.

Close Case - case name: Closes the open case that has focus.

Print: Prints the contents of the window with focus. You may customize printing using the File|Page Setup menu command.

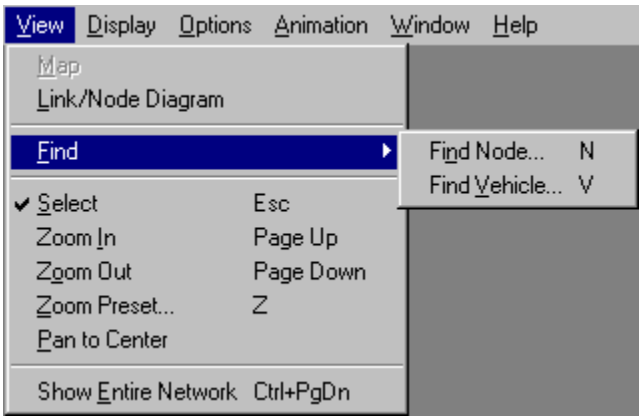
Page Setup…: Invokes the Page Setup dialog. This allows you to customize the printed page. Available options include setting margins and adding a title, caption, and footer to the printed page with user-designated offsets. See Section 2.17.1 for details. This option is not available in the UNIX version.

Print Setup…: Invokes the Print Setup dialog. This dialog allows you to modify printer settings such as the paper size and orientation. This option is not available in the UNIX version.

Exit TRAFVU: Closes all open windows and exits TRAFVU.

2.6.2 View

The View menu commands affect only the Network window with focus. It contains the following commands:



Map: This command displays the network as a map.

Link/Node Diagram: This command displays the network as a link/node diagram.

Find: When you select the Find option, a submenu will appear. This submenu contains two selections, Find Node and Find Vehicle. These are explained below.

- Find Node: This command allows you to search for a specific node. You must enter the desired node ID number. If this node exists, the system will find and select it. Because the Find Node command does not change window focus, you will not see the selected node if it exists outside of your current view. However, you may scroll or select Show Entire Network in order to view the selected node. The Find Node command works best when the entire network is in view.

- Find Vehicle: This command allows you to search for a specific vehicle. You must enter a vehicle ID number to conduct a search. If the vehicle exists, the system will find and flag it. Because the Find Vehicle command does not change window focus, you will not see the flagged vehicle if it exists outside of your current view. However, you may scroll or select Show Entire Network in order to view the selected vehicle. The Find Vehicle command works best when the entire network is in view. Vehicles must be turned on in order to use this command.

Select: Choosing this option changes the cursor to the selection arrow.

Zoom In: Choosing this option changes the cursor to the "magnifying glass" zoom-in shape while the cursor is over the window with focus. This magnifying glass cursor has two functions:

- Place the cursor on a specific point in the network and click the left mouse button to cause that point to become the center of an updated view, zoomed to a higher pre-set magnification level. Additionally, you

can use the **<Page Up>** key to zoom in slightly on a network using the current center of the viewable area as the center of the new area.

- To magnify a specific area, place the cursor on a point that you want to become a corner of a zoomed-in view. Press down on the left mouse button and drag the "rubber band" box to the point that forms the opposite corner of the new view. When you release the mouse button, the area within the "rubber band" becomes the new magnified view. If you hold down the **<CTRL>** key while performing this action, the zoomed-in image appears in a new window. After choosing this option, you may abort the zoom-in by pressing the **<ESC>** key.

Zoom Out: Choosing this option changes the cursor to the "magnifying glass" zoom-out shape while the cursor is over the window with focus. Place this cursor on a specific point in the network and click the left mouse button to cause that point to become the center of an updated view, zoomed to a lower pre-set magnification level. If you hold down the **<CTRL>** key while performing this action, the zoomed-out image appears in a new window. Additionally, you can use the **<Page Down>** key to zoom out slightly on a network using the current center of the viewable area as the center of the new area. After choosing this option, you may abort the zoom-out by pressing the **<ESC>** key.

Zoom Preset…: This command displays the Zoom Capture and Set dialog. Using this dialog, you can set, save, and recall the size (zoom level) of a Network window. When displayed, this dialog lists the size of the currently active Network window in terms of X and Y coordinates. The dialog also contains a number of buttons that enable you to set, save, and recall the size of the window.

Pan to Center: Choosing this option changes the cursor to the pan-to-center shape while the cursor is over the window with focus. Place this cursor on the network and click to redraw the network with the point under the cursor as the center of the new view. This function does not change the zoom-level of the view and can be duplicated using scroll bars. After choosing this option, you may abort the pan operation by pressing the **<ESC>** key.

Show Entire Network: Displays the entire network in the window with focus. You can invoke this operation at any time by pressing the **<CTRL>+<PgDn>** accelerator key.

2.6.3 Display

The Display menu controls which objects (vehicles, signals, bus routes, etc.) are visible: (1) during animation, and (2) in static views of the network. If no objects of the listed type are available for display, the menu item is grayed out and disabled. The Display menu Commands affect only the Network window with focus. It contains the following commands:

Tables and Graphs: This command opens the Tables and Graphs window for the selected set of network objects. See Section 2.12 for details concerning Tables and Graphs.

Vehicle - This command toggles the display of vehicles on the network. Vehicle locations and incidents are synchronized with the simulation clock during animation.

Traffic Control: This command toggles the display of signal heads or signs at links under actuated (round), pre-timed (square), signed, and ramp-metered (diamond) control. Signal heads show their state, synchronized to the clock, during animation.

MOE: The first click on the MOE menu option opens the MOE Selection dialog, where you select a MOE and specify the levels-of-service (LOS) applied to that MOE. If you have previously specified MOE animation, clicking this menu option applies the defined parameters to the network map; the MOE Selection dialog does not reappear. To reactivate the MOE Selection dialog, use the MOE Preferences item under the Options pull-down menu or double click the "MOE" label in the legend. See Section 2.11 for details on MOE animation.

Bitmap Background: This command toggles the display of a bitmap in the map background, if available. Bitmaps used for backgrounds are specified in the CORSIM input file.

Bus Routes: This command toggles the display of bus routes.

Bus Stations: This command toggles the display of bus stations.

Lane Markings: This command toggles the display of lane markings. By clicking either mouse button on a lane marking, TRAFVU will display an information box that describes the lane marking.

Link Text: This command toggles the display of link text. Currently, this item displays link names as specified in the CORSIM input file.

Parking Zones: This command toggles the display of parking zones.

Sensors: This command toggles the display of surveillance detectors, actuated controller sensors and data stations.

Warning and HOV Signs: This command toggles the display of warning signs and HOV signs.

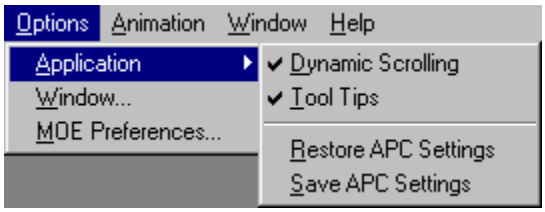
Clear Display Settings: This command clears the display of all network objects identified in this menu. It restores the associated toolbar buttons to their unpressed state and removes the checks on all Display menu items.

Restore Display Settings: This command restores the display of network objects according to their previously saved state. It restores the associated toolbar buttons and sets the checks on all Display menu items accordingly.

Save Display Settings: This command saves the current display state for all network objects identified in this menu.

2.6.4 Options

The Options menu contains the following commands:



Application: When you select the Application option, a submenu will appear. This submenu contains two selections, Dynamic Scrolling and Tool Tips. These are explained below.

- Dynamic Scrolling: This command allows dynamic scrolling with the scroll bar thumbs. Dynamic scrolling means that the view is updated simultaneously with the movement of the thumbs. Use of this command is discouraged on slower machines, because it is process intensive.
- Tool Tips: This command allows you to enable or disable the display of tool tips for tool bar and APC dialog (when maximized) buttons.
- Restore APC Settings: This command restores the APC dialog settings to the values saved in the system registry for the current user. These settings include the size and location of the APC dialog.
- Save APC Settings: This command saves the current APC dialog settings to the system registry for the current user.

Window: This command opens a dialog that allows you to select options that affect individual windows. You may also activate this dialog by double clicking on the "Vehicle Color" label in the legend or by right clicking the mouse in the TRAFVU background. See Section 2.14 for details about vehicle colors and detail.

MOE Preferences: This command opens the MOE Selection dialog where you select a MOE and specify the levels-of-service (LOS) applied to that MOE. You can also activate this dialog by double clicking on the "MOE" label in the legend. See Section 2.11 for details on MOE animation.

2.6.5 Animation

The Animation menu controls animation. It contains the following commands:

Set Time - case name…: This command establishes time parameters for a simulation animation run. Selecting this command opens the Animation Time Control dialog. This dialog allows you to specify the current time, start time, and stop time for animation. Additionally, you can specify the animation to skip simulation data points, a useful feature when animating MOE. The parameters you specify in this dialog apply only to the current simulation case (i.e., the case window that had focus when you invoked the dialog). However, all windows for the selected case are affected. For more information see Section 2.10.

Play in Reverse: This command plays the animation in reverse. The **<R>** accelerator key duplicates this function.

Pause: This command pauses the animation. The **<Space Bar>** accelerator key duplicates this function.

Play: This command advances (plays) the animation. The **<P>** accelerator key duplicates this function.

Single Step Forward: This command advances the animation one frame. The **<F>** accelerator key duplicates this function.

Single Step Backward: This command reverses the animation one frame. The **<B>** accelerator key duplicates this function.

Reset To 1 frame/s: This command resets the frame delay to 1 second. The **<T>** accelerator key duplicates this function.

Reset To Start Time: This command resets the clock to the start time specified in the Animation Time Control dialog. The **<S>** accelerator key duplicates this function.

2.6.6 Window

The Window menu contains the following commands:

New Window - case name: Creates a new window showing the entire network for the named CORSIM case.

Close Window -case name: Closes the window that has focus. If the window is the last open Network window for a case, this command also closes the case.

Horizontal Tile: Tiles all Network windows horizontally.

Tile Windows: Tiles all Network windows.

Cascade Windows: Cascades all Network windows.

Raise APC: Toggles between a visible (checked) and invisible (unchecked) APC dialog. Available under UNIX only.

Show/Hide Tool Bar: Toggles between a visible (checked) and invisible (unchecked) tool bar in the window with focus.

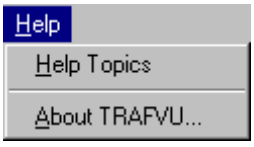
Show/Hide Legend: Toggles between a visible (checked) and invisible (unchecked) legend in the window with focus. The legend displays information regarding vehicle color, MOE type, and signals. See Section 2.8 for details on using the legend.

Show/Hide Status Bar: Toggles between a visible (checked) and invisible (unchecked) status bar.

Case Description - case name…: Opens the Case Description window that displays information about the CORSIM case represented in the window with focus.

2.6.7 Help

The Help menu contains the following commands:



Help Topics: Activates the TRAFVU help facility.

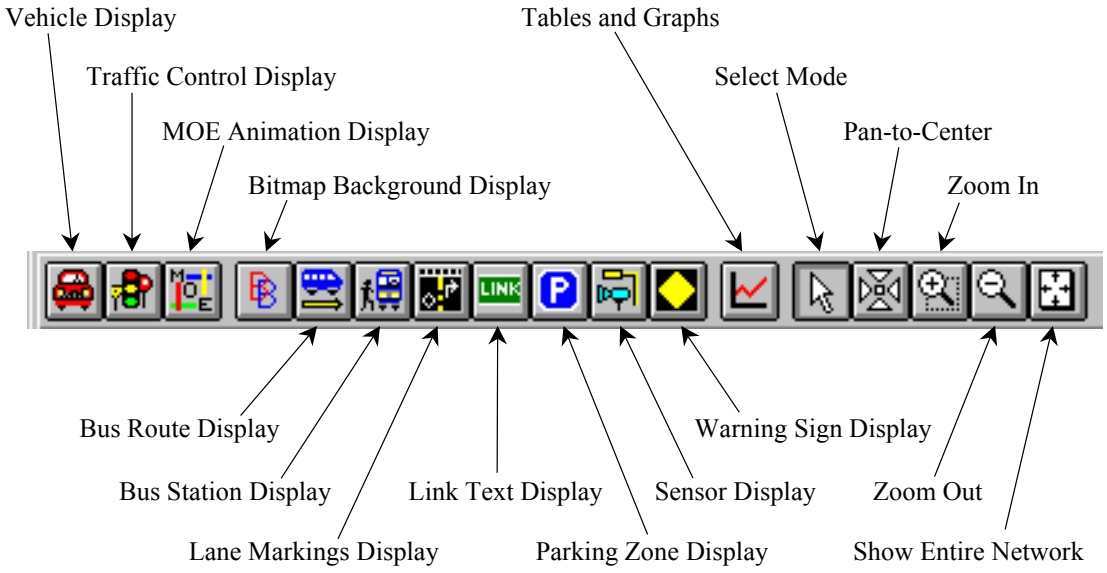
About TRAFVU…: Provides general information about TRAFVU.

2.7 Tool Bar

The tool bar, illustrated in the following figure, is a handy shortcut for invoking several of the more frequently used menu commands. Pressing a tool bar button invokes the corresponding menu selection. For example, pressing the bus station button invokes the same system response as selecting the Display|Bus Stations menu command.

The following text describes the functionality of each button on the tool bar. Buttons have three possible states: "unpressed", "pressed" or "disabled". Please note, "pressed" implies that the button is in the down position and transitions to the up (unpressed) position when clicked. The term "unpressed" indicates the button is in the up position and transitions to the down (pressed) position when clicked. The term "disabled" indicates the button is not active, i.e., no action occurs when you click the button. A disabled button appears grayed out when the type of object it represents is not available in the simulation. For example, if no parking zones have been specified in the simulation input file then the Parking Zone button is disabled.

To increase the viewing area of the Network window you can hide the tool bar, legend, and status bar by using the Show/Hide Tool Bar, Show/Hide Legend, and Show/Hide Status bar items under the Window pull-down menu.



TRAFVU Tool Bar

BUTTON FACE	DESCRIPTION
	Vehicle Display Button: Displays vehicles and incidents in the Network window. The locations of vehicles and incidents are synchronized with the simulation clock.
	Traffic Control Display Button: Displays signal heads or signs at links under actuated (round), pre-timed (square), signed, and ramp-metered (diamond) control. Signal heads show their state, synchronized to the clock, during animation.

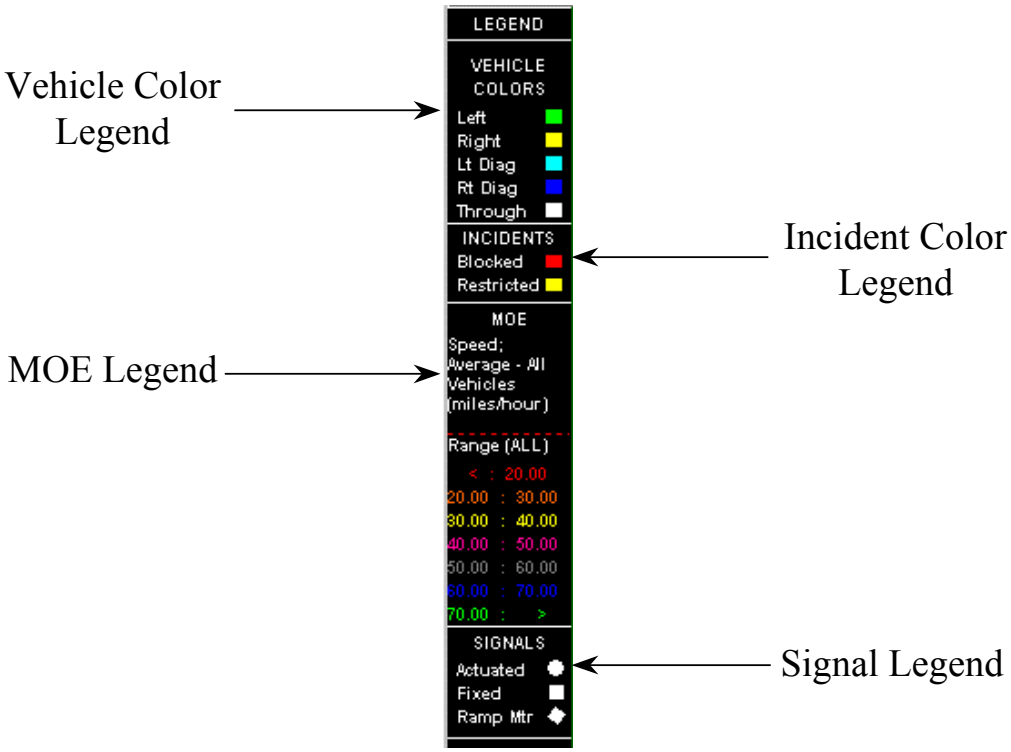
BUTTON FACE	DESCRIPTION
	MOE Display Button: The first press of the MOE Selection button opens the MOE Selection dialog, where you select a MOE and specify the levels-of-service (LOS) applied to that MOE. If you have previously specified MOE animation, pressing this button applies the defined parameters to the network map; the MOE Selection dialog does not reappear. To reactivate the MOE Selection dialog, use the MOE Preferences item under the Options pull-down menu or double click the "MOE" label in the legend. See Section 2.11 for details on MOE Animation.
	Bitmap Background Display Button: Displays a bitmap in the map background. The name of the file that contains the bitmap and the dimensions of the bitmap, in map units, are specified in the CORSIM input file.
	Bus Route Display Button: Displays bus routes.
	Bus Station Display Button: Displays bus stations.
	Lane Markings Display Button: Displays lane markings. By clicking either mouse button on a lane marking, TRAFVU will display an information box that describes the lane marking.
	Link Text Display Button: Displays link text. Currently, link text consists of the link name, as specified in the CORSIM input file.
	Parking Zone Display Button: Displays parking zones.
	Sensor Display Button: Displays surveillance sensors, actuated controller detectors, and data stations.
	Warning Sign Display Button: Displays warning and HOV signs.
	Tables and Graphs Button: Opens the Tables and Graphs window for the selected set of network objects.
	Select Cursor Button: Pressing this button changes the cursor to a selection arrow. In this state, you can select objects and display attributes for objects in the map view. This is the default mode for the cursor.
	Pan To Center Button: Pressing this button changes the cursor to the pan-to-center shape while the cursor is over the window with focus. Clicking in the network redraws the network with the point under the cursor as the center of the new view. This function does not change the zoom-level of the view and can be duplicated using the Network window scroll bars. After choosing this button, you may abort the pan by pressing the **<ESC>** key.

BUTTON FACE	DESCRIPTION
	Zoom In Button: Pressing this button changes the cursor to the "magnifying glass" zoom-in shape while the cursor is over the window with focus. This magnifying glass cursor has two functions: (1) Place the cursor on a specific point in the network and click the left mouse button to cause that point to become the center of an updated view, zoomed to a higher pre-set magnification level. Additionally, you can use the **<Page Up>** key to zoom in slightly on a network using the current center of the viewable area as the center of the new area. (2) To magnify a specific area, place the cursor on a point that you want to become a corner of a new zoomed-in view. Press down on the left mouse button and drag the "rubber band" box to the point that forms the opposite corner of the new view. When you release the mouse button, the area within the "rubber band" becomes the new magnified view. If you hold down the **<CTRL>** key while performing this action, the zoomed-in image appears in a new window. After choosing this button, you may abort the zoom-in by pressing the **<ESC>** key.
	Zoom Out Button: Pressing this button changes the cursor to the "magnifying glass" zoom-out shape while the cursor is over the window with focus. Place this cursor on a specific point in the network and click the left mouse button to cause that point to become the center of an updated view, zoomed to a lower pre-set magnification level. If you hold down the **<CTRL>** key while performing this action, the zoomed-out image appears in a new window. Additionally, you can use the **<Page Down>** key to zoom out slightly on a network using the current center of the viewable area as the center of the new area. After choosing this button, you may abort the zoom-out by pressing the **<ESC>** key.
	Show Entire Network Button: Displays the entire network in the window with focus.

2.8 Legend

The following figure illustrates the Network window legend. The legend contains information regarding vehicle colors, MOE animation, and signals. The legend displays this information only when the corresponding items are displayed on the network. For example, the vehicle color key appears only when vehicles are displayed on the network. By default, the legend is visible. However, you may remove the legend and tool bar to increase the network viewing area. To remove the legend, double click the "LEGEND" title with the left button of the mouse. You can also control the visibility of the legend via the Window|Show/Hide Legend menu selection.

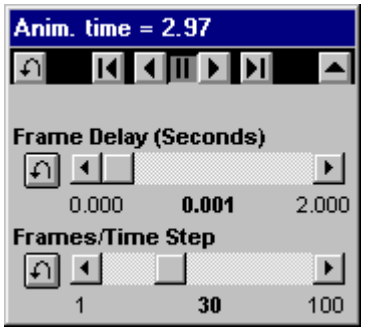
The legend also provides you quick access to the MOE Selection dialog and the vehicle color dialog. To activate the MOE Selection dialog, double click the "MOE" label in the legend. To activate the vehicle color dialog, double click the "VEHICLE COLORS" label in the legend.



Network Window Legend

2.9 Animation Playback Control (APC)

The APC dialog uses VCR style buttons to control animation. Animation is the display of consecutive frames or snapshots of the simulation for all open cases and windows. The APC duplicates most of the functionality afforded by the Animation menu item in the Network window menu bar. However, you can access the Animation Speed slider control ("Frame Delay") and the Interpolation slider control ("Frames/Time Step") only via the APC. The APC is always in the foreground; however, you may move it to any part of the screen or reduce its size to prevent it from obstructing your view of the network.



APC Dialog

During animation the APC title bar displays the speed of the animation relative to real time. Animation speed is expressed in time steps/second and updates every 60 frames. If, for example, the duration of the simulation case is 10 minutes and the speed is 0.5 time steps/second (1/2 times real time), then animation of the entire case would take twenty minutes. If the speed is 2 time steps/second (2 times real time), then animation of the entire case would take 5 minutes.

When you pause the animation or when the animation reaches the end of simulation time, the title bar displays the elapsed real time in seconds. Keep in mind that the size of the network and platform capability dictate the range of attainable speeds.

2.9.1 APC Buttons

The APC contains two types of buttons: momentary contact (button is pressed while mouse button is pressed and is released when mouse button is released), and radio buttons. Radio buttons have three possible states: "unpressed," "pressed," or "disabled." Please note that "pressed" implies that the button is in the down position and transitions to the up (unpressed) position when clicked. The term "unpressed" indicates that the button is in the up position and transitions to the down (pressed) position when clicked. The term "disabled" indicates that the button is not active and no action will occur when you click the button. The following describes the function of each APC button:

BUTTON FACE	DESCRIPTION
	Reset to Start Time button: A momentary contact button that resets the animation time to the start time specified in the Animation Time Control dialog. The **<S>** accelerator key duplicates this function.
	Single Step Backward button: A momentary contact button that reverses the animation one frame. The **<B>** accelerator key duplicates this function.
	Play In Reverse button: A radio button that reverse plays the animation. The **<R>** accelerator key duplicates this function.
	Pause button: A radio button that freezes animation. The **<Space Bar>** accelerator key duplicates this function.
	Play button: A radio button that advances (plays) the animation. The **<P>** accelerator key duplicates this function.
	Single Step Forward button: A momentary contact button that advances the animation one frame. The **<F>** accelerator key duplicates this function.
	Dialog Size button: A momentary contact button that expands or reduces the APC dialog to show or hide the Animation Speed slider control and the Interpolation slider control.
	Reset to 1 Second between frames button: A momentary contact button that resets the frame delay to 1 second. The **<T>** accelerator key duplicates this function.
Frame Delay Slider Control	**Frame Delay slider control**: Allows you to adjust the speed of animation. Delay is defined in terms of the amount of time between frames. You may also adjust the speed using the <→> (increase) and <←> (decrease) accelerator keys.
	Reset to 1 Frame per Time Step button: A momentary contact button that resets the animation to 1 frame per simulation time step. It turns off interpolation.
Frames / Time Step Slider Control	**Frames/Time Step slider control**: Allows you to specify the number of frames per simulation time step for interpolation. You may also adjust the interpolation using the **<Shift>+<→>** (increase) and **<Shift>+<←>** (decrease) accelerator keys.

2.9.2 Frame Delay

The Frame Delay slider control allows you to adjust the display speed of the animation. For this application, delay is defined in terms of seconds per frame. For example, if you move the slider's thumb all the way to the right, TRAFVU adds a two second delay between each update. This causes animation to be very slow. If you move the thumb all the way to the left, TRAFVU adds no delay time and animation runs as fast as possible.

Keep in mind that the size of the network and platform capability dictate the range of attainable speeds. When the APC dialog has focus, you can adjust the display speed with the <→> (increase) and <←> (decrease) accelerator keys. Also associated with this slider control is a reset button. When pressed, this button resets the frame delay to 1 second.

2.9.3 Interpolation

TRAFVU's default animation mode is to display state data only at the times those data are output by the CORSIM model (e.g., once every second). In this mode regardless of the animation speed, vehicles appear to hop along the roadways because the distances vehicles travel in one second can be very large, especially for vehicles traveling on high-speed freeways. To improve the quality and smoothness of the animation, TRAFVU provides an option to generate additional vehicle states. These states are obtained by interpolating between CORSIM produced states. Interpolation allows you to smooth the movement of vehicles as they animate, producing a more pleasing effect to the eye. However, interpolation slows down the animation.

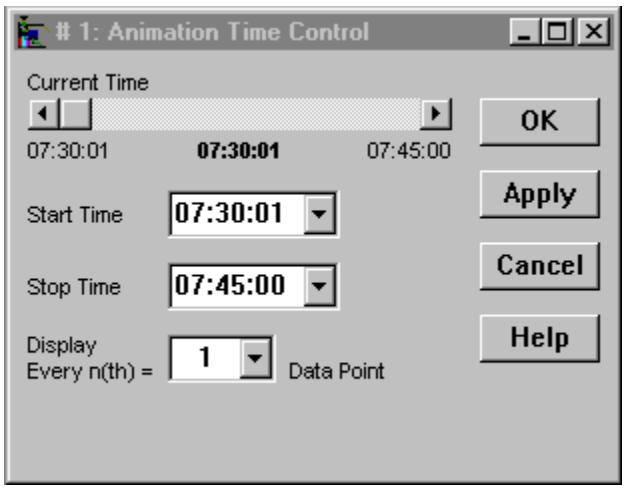
Interpolation is set via the lower slider control in the APC and is expressed in terms of frames/time step. A value of 1 frame/time step (slider control set to left extreme) means that no interpolation is used (only the simulation-generated data points are displayed). A value of 2 or greater displays the simulation-generated data points plus TRAFVU-generated data points. For example, a value of 4 adds 3 interpolated data points for every simulation data point. Increasing the frames/time step increases the smoothness of the animation but decreases the speed of the animation. When the APC dialog has focus, you can adjust the interpolation with the **<Shift> +<→>** (increase) and **<Shift> +<←>** (decrease) accelerator keys. Also associated with this slider control is a reset button. When pressed, this button resets the interpolation to 1 frame/time step (no interpolation).

Finally, interpolation is applied equally to ALL simulation runs being displayed by TRAFVU. That is, you cannot specify 3 frames/time step for one case and 5 frames/time step for a second case. Likewise, you cannot perform interpolation on one case and turn interpolation off for a second case.

NOTE: When interpolating, the data point display control in the Animation Time Control dialog is automatically set to 1 and it is disabled.

2.10 Animation Time Control

The following figure illustrates the Animation Time Control dialog. This dialog allows you to specify the current time, start time, and stop time for animation. Additionally, you can specify the animation to skip simulation data points, a useful feature when animating MOE. The parameters you specify in this dialog apply only to the current simulation case (i.e., the case window that had focus when you invoked this dialog). However, all windows for the selected case are affected. The Animation Time Control dialog contains a slider control for setting the current time, three drop-down edit boxes, and four buttons:



Animation Time Control Dialog

Current Time Slider Control: Allows you to set the current time for the animation of the selected case. When adjusting the current time, the time displays are updated in the title bars of all the affected windows. During animation, the "slider thumb" moves to indicate the current time. The range displayed by the slider control is set by the Start and Stop time controls described below. If the thumb has focus (indicated by its flashing), you can move the thumb using the <←> (decrease) and <→> (increase) accelerator keys.

Start Time: Specifies the time, as defined by the simulation, when the animation starts. The default value is the start time of the simulation defined in the input specification file. A drop down list shows the start times of all time periods specified in the input file. You can select times from the drop down list or type in a valid time. This can be useful if you only want to view certain time steps during the animation. You cannot set the start time to a time earlier than specified in the input file.

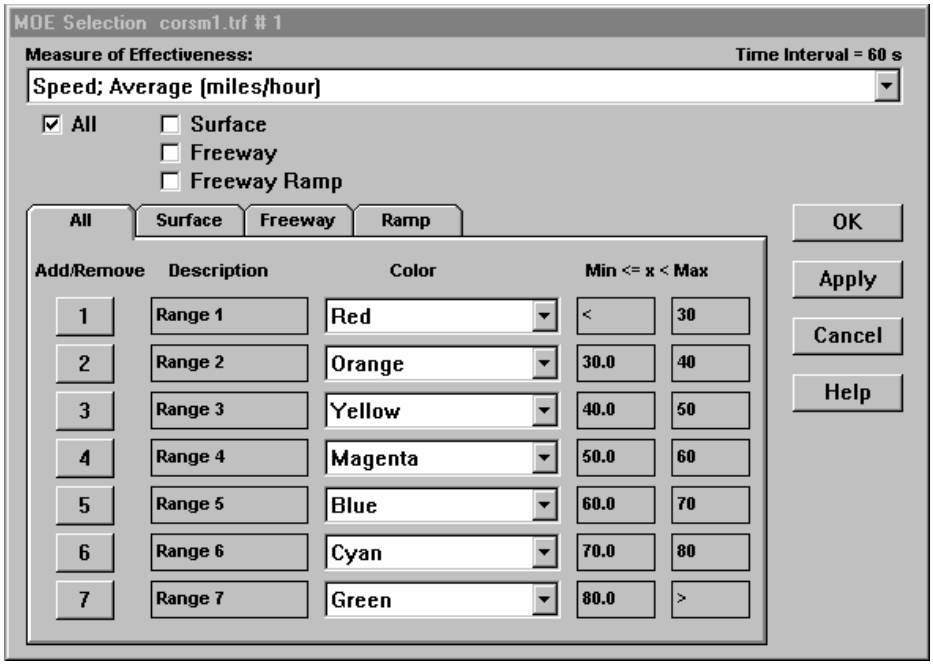
Stop Time: Specifies the time, as defined by the simulation, when the animation stops. The default value is the stop time of the simulation defined in the input specification file. A drop down list shows the end times of all time periods specified in the input file. You can select times from the drop down list or type in a valid time. This can be useful if you only want to view certain time steps during the animation. You cannot set the stop time to a time later than specified in the input file. Additionally, the stop time must be set to a value greater than the start time.

Display Every n(th) = Data Point: This drop-down edit box allows you to skip data points when displaying animation. This feature is useful when you want to display a snapshot of the vehicle states or MOE values at specified time intervals. For example, the simulation updates MOE values at a user-defined simulation time interval. The last value in the drop-down list represents this user-defined time interval. A value of 1 indicates every data point is displayed during animation. This feature is disabled when interpolation is active.

Once you have selected the start and stop times and/or a time step increment, press the **Apply** button to apply the selections to the case. The **OK** button also applies your selections to the case and closes the Animation Time Control dialog. If you have specified a start or stop time that is out-of-bounds, pressing the **Apply** or **OK** button causes TRAFVU to display a warning. The **Cancel** button rejects your pending selections and closes the dialog.

2.11 MOE Animation

The following figure illustrates the MOE Selection dialog. This dialog appears when you select the MOE Preferences item under the Options pull-down menu, the first time you press the MOE Animation tool bar button, or the first time you select the Display|MOE menu item. You can also double click on the "MOE" label in the legend to activate this dialog.



MOE Selection Dialog

The MOE Selection dialog allows you to select a single MOE and specify the levels-of-service (LOS) applied to that MOE. You may apply the same LOS to all sub-networks or select different LOS for surface-street, freeway, and freeway ramp sub-networks. In specifying the LOS, select a color to represent each LOS on the network map during animation. The selected MOE is synchronized with the clock, but is only updated at the interval rate defined in the simulation input file.

To apply the same set of color code and range values to all sub-network types, check the "All" box. If you want to apply a different color code and set of range values to each of the three types of sub-network, check the appropriate sub-network boxes rather than the "All" box. The tabs displayed under the sub-network choice are available only if checked in the sub-network choice.

The dialog initially specifies one range that includes all possible values of the selected MOE. You may add up to six additional ranges for a total of seven. To add a range, enter a maximum value for the last specified range and press **<Enter>, <Tab>,** or the next range number button. This process automatically fills in the next range's minimum value and places the cursor in the next range's maximum value field, allowing you to easily enter consecutive ranges. To enter non-consecutive ranges, edit the values by clicking in the value edit box and changing the number. Ranges cannot overlap and must increase monotonically. For example, Range 1 may range from 10 to 20 and Range 2 may range from 30 to 40. However, Range 1 cannot be from 30 to 40 and Range 2 from 10 to 20. For Range 1 the minimum value may be specified as "<" which translates to all values less than the maximum for Range 1. For the last range specified, the maximum value may be specified as ">" which translates to all values greater than the minimum for that range. Finally, to remove a range, click on its range number button. All other ranges move up to fill in the deleted range.

Each window can display only one MOE. To display multiple MOEs for a network, you must instantiate multiple windows of that same network.

2.12 Tables and Graphs

The Tables and Graphs feature in TRAFVU allows you to analyze the results of a CORSIM run using tabulated displays of data and two-dimensional (2-D) line graphs. For example, you can select the links in an arterial and graph the average travel times on those links as a function of the time of day. After optimizing the signal timings on those links, you can produce the same graph for the new run and compare it side-by-side with the run using the original timings.

2.12.1 Capabilities

With the current version of TRAFVU Tables and Graphs you may view link attributes and measures of effectiveness (MOE) as a function of time. In this version, links are the only objects for which you may display tables and graphs. In a single table or graph you may view multiple attributes for a single link or a single attribute for multiple links. However, TRAFVU limits you to a maximum of 20 curves per plot or 20 columns per table. When plotting multiple attributes for a single link, the selected attributes must have the same units. Finally, you are allowed to generate multiple tables and graphs for a single Network window. Just click on the Tables and Graphs button to display additional Tables and Graphs windows.

2.12.2 Display Formats

The graph format displays data in a 2-D, x-y line graph with time plotted along the x-axis. Each curve in the graph represents a different attribute or link.

The table format displays data in a grid where each row represents a different time and each column represents a different attribute or link.

2.12.3 Basic Usage

To produce a table or graph you must first select an object or set of objects using the mouse. Selected objects appear highlighted (see Sections 2.5.3 and 2.5.5). If TRAFVU allows tables and graphs to be generated for the class of objects you selected (e.g., links), the Tables and Graphs button in the window's tool bar becomes enabled. After selecting an object or set of objects (up to 20), press the Tables and Graphs button. A window appears that allows you to specify the attributes or MOE you wish to view for the object(s) you selected.

With the Tables and Graphs window you may select attributes or MOE from two different lists: "User-Specified Input Data" and "Simulation-Generated Data". If you selected multiple objects (e.g., links), this window allows you to select only one attribute or MOE. If you selected a single object, you may select multiple attributes or MOE from the lists. However, once you have specified the first attribute, you are allowed to select only those attributes that have the same units as the first. Selected attributes appear in the Selected Data list to the right of the window. You may select an attribute by highlighting the attribute in a list then pressing the Add button. You may also select an attribute by double clicking the attribute in the selection list. In the same manner, you can delete an attribute from the Selected Data list.

Once you have selected an attribute or set of attributes, press either the Table or the Graph button at the bottom of the window to display either a table or graph. Tables and graphs are displayed in the same window as the data selection lists. Note, once you have generated a table or graph, you may switch from one to the other using buttons in the button bar at the top of the display. From the Data Selection View button in the table or graph button bar, you may return to the data selection lists. Finally, you can remove the Table and Graph window by pressing the Close button in the Data Selection view or by pressing the Exit button in either the Table or Graph view.

2.12.4 Table and Graph Window Details

The Tables and Graphs window contains three separate views, only one of which is displayed at any one time. These views are: Data Selection, Graph, and Table.

2.12.4.1 Data Selection View

The Data Selection view contains three scrollable lists and 8 buttons as illustrated:

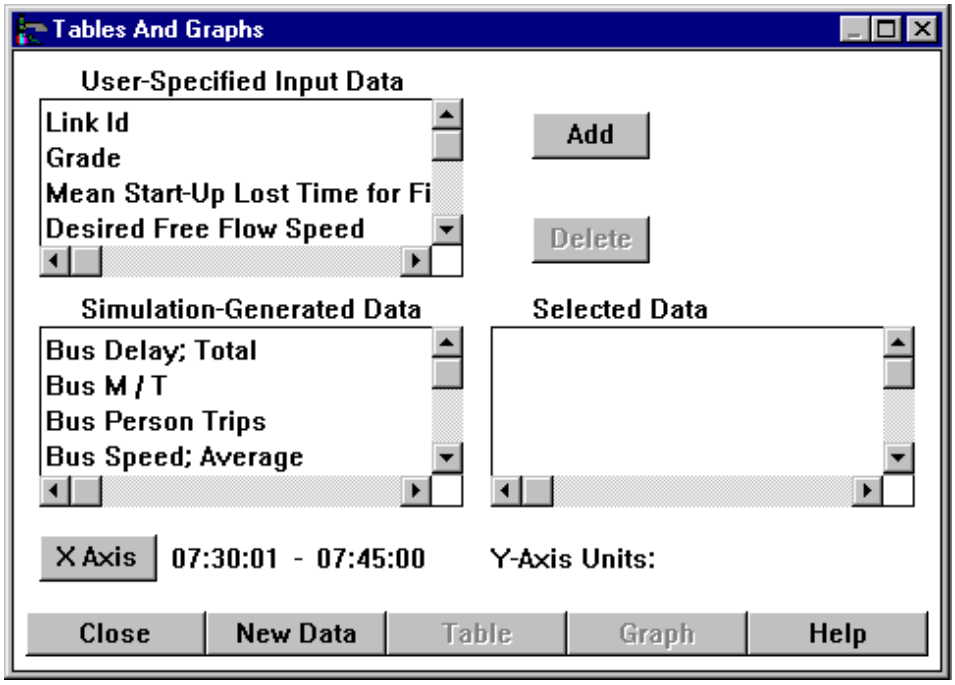


Table and Graph Data Selection View

User-Specified Input Data: This scrollable list contains a set of attributes for an object that are specified by the user and are inputs to the CORSIM simulation. For example, the user specifies the Desired Free Flow Speed for a link as input to CORSIM. This list contains both time-invariant attributes and those input attributes that vary by time period.

Simulation-Generated Data: This scrollable list contains data items for an object that are generated by CORSIM. These outputs vary by time. For example, Average Speed for All Vehicles on a link.

Selected Data: This scrollable list contains those data items you selected for viewing from the other two lists described above. All selected data items must have the same units. Units are defined by the first selected item on the list.

Add: This button is used to add an item from the selection lists to the Selected Data list. To add an item, highlight the desired item in the selection list by clicking on it with the left mouse button. Then press the **Add** button. The selected item appears and becomes enabled on the Selected Data list and becomes disabled on the list it came from.

Delete: This button is used to remove an item from the Selected Data list. To delete an item, highlight the desired item in the Selected Data list by clicking on it with the left mouse button. Then press the **Delete** button. The selected item disappears on the Selected Data list and becomes enabled on the list it came from. In the current software release, you must use the **New Data** button to change data in the Selected Data list after you have displayed a table or graph.

X Axis: This button displays the X-Axis Range dialog that allows you to specify the range of time for the data included in the table or displayed in the graph.

Close: This button closes the Tables and Graphs window.

New Data: This button clears the table and graph and erases the entries in the Selected Data list. In the current software release, you must use this button to change data in the Selected Data list after you have displayed a table or graph.

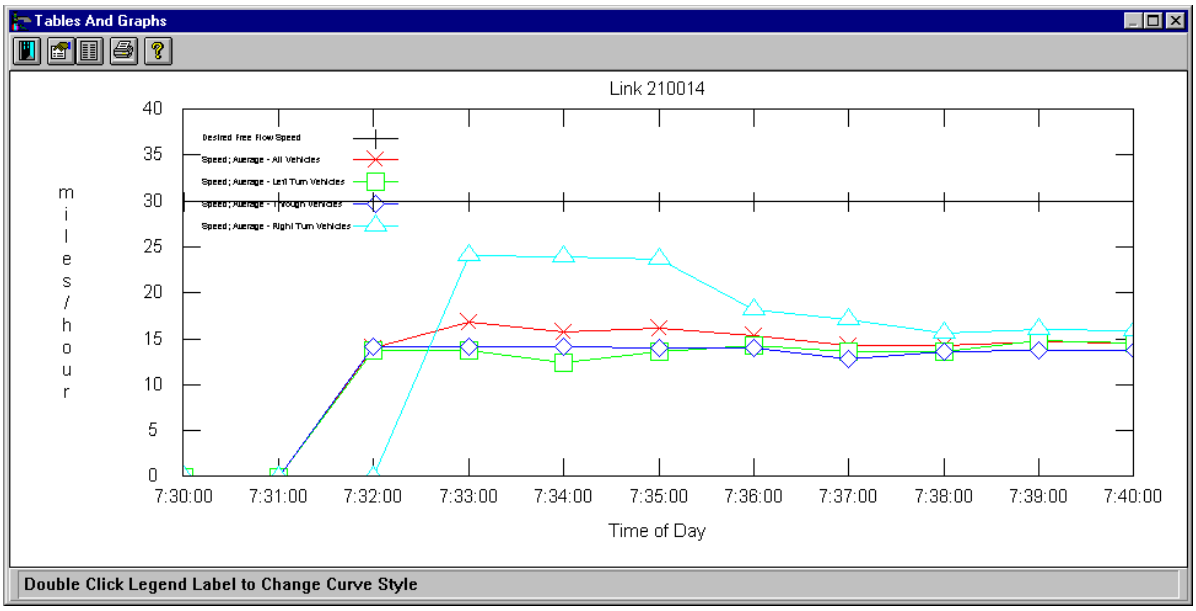
Table: This button displays a table of values for the data items you selected (those items in the Selected Data list).

Graph: This button displays a graph that contains curves for the data items you selected (those items in the Selected Data list).

Help: Displays a help window containing instructions for using the Tables and Graphs feature in TRAFVU.

2.12.4.2 Graph View

The Graph view, illustrated below, contains a button bar at the top of the window and a status bar at the bottom of the window. The graph is displayed in the region between the button bar and the status bar. Enlarging or shrinking the window enlarges or shrinks the graph. Static (time-invariant) data are plotted as a flat line. User-specified input data that vary by time period appear as "stair steps".



Graph View

The status bar displays descriptions of the buttons in the button bar when you place the mouse cursor over a button. The button bar contains five buttons as illustrated above and described below:

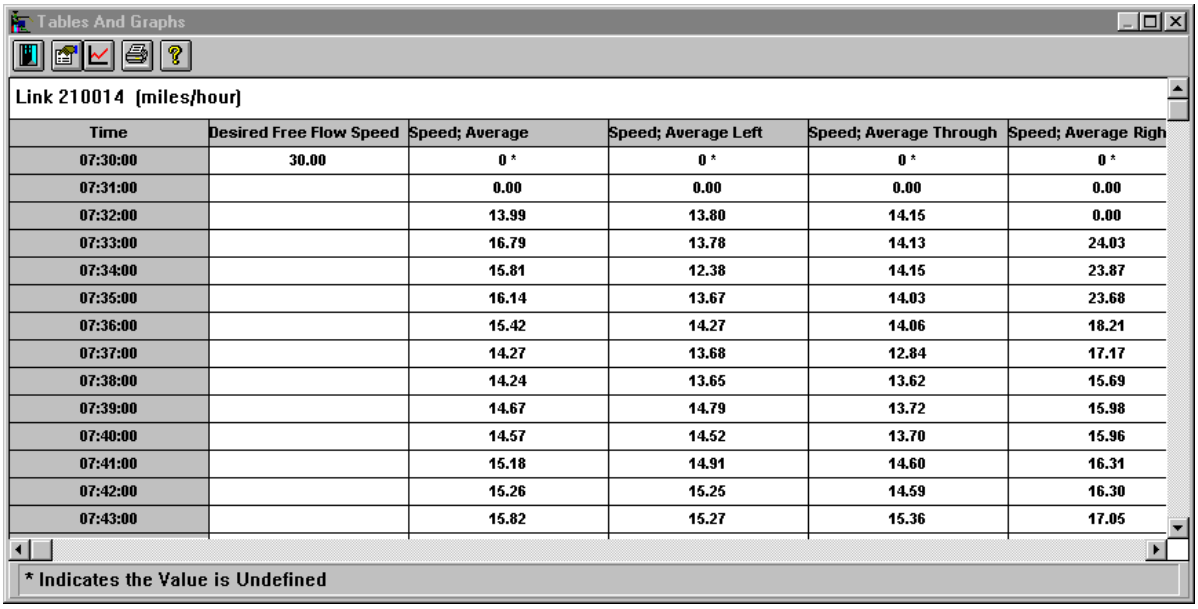
BUTTON FACE	DESCRIPTION
	The Exit button closes the Tables and Graphs window.
	The Data Selection View button switches the window to the Data Selection view.
	The Table View button switches the window to the Table view.
	The Print button prints the graph. Printing uses a "what you see is what you graph" algorithm to produce a printed version of the graph that matches closely in size to the graph displayed on your screen. Therefore, by enlarging or shrinking the display window, you can affect the size of the printed graph.

BUTTON FACE	DESCRIPTION
	The Help button displays help for the Tables and Graphs feature.

Within the graph area, you may double click on a curve definition in the graph legend. This action displays the Plot Style dialog for the selected curve. From this dialog, you may change the color, line style, and symbol type of the selected curve. Double clicking on the actual curve in the graph area displays a dialog that lists the x and y data values for the data point nearest to the point you clicked. You may also zoom-in on an area of the graph by pressing the left mouse button and dragging the rubber-band box to enclose the area you wish to see. Double clicking on any blank space in the graph area returns the graph to its original size. You may need to resize the display window to see the legend text or axis labels.

2.12.4.3 Table View

The Table view, illustrated below, contains a button bar at the top of the window and a status bar at the bottom of the window. The table is displayed in the scrollable region between the button bar and the status bar. Static (time-invariant) data appear only in the first row and are not repeated in subsequent rows. User-specified input data that vary by time period appear only in the rows that demarcate time periods.



Time	Desired Free Flow Speed	Speed; Average	Speed; Average Left	Speed; Average Through	Speed; Average Righ
07:30:00	30.00	0 *	0 *	0 *	0 *
07:31:00		0.00	0.00	0.00	0.00
07:32:00		13.99	13.80	14.15	0.00
07:33:00		16.79	13.78	14.13	24.03
07:34:00		15.81	12.38	14.15	23.87
07:35:00		16.14	13.67	14.03	23.68
07:36:00		15.42	14.27	14.06	18.21
07:37:00		14.27	13.68	12.84	17.17
07:38:00		14.24	13.65	13.62	15.69
07:39:00		14.67	14.79	13.72	15.98
07:40:00		14.57	14.52	13.70	15.96
07:41:00		15.18	14.91	14.60	16.31
07:42:00		15.26	15.25	14.59	16.30
07:43:00		15.82	15.27	15.36	17.05

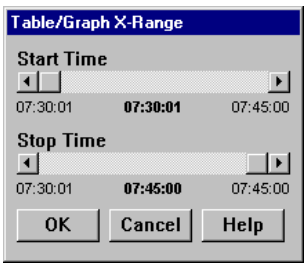
Table View

The status bar displays descriptions of the buttons in the button bar when you place the mouse cursor over a button. The button bar contains five buttons as illustrated above and described below:

BUTTON FACE	DESCRIPTION
	The Exit button closes the Tables and Graphs window.
	The Data Selection View button switches the window to the Data Selection view.
	The Graph View button switches the window to the Graph view.
	The Print button prints the table.
	The Help button displays help for the Tables and Graphs feature.

2.12.4.4 X-Axis Range Dialog

The following figure illustrates the X-Axis Range dialog. To access this dialog, press the **X Axis** button on the Data Selection view of the Tables and Graphs window. This dialog allows you to specify the range of times displayed on the x-axis of a graph or in the rows of a table. The maximum range you may specify is limited to the range of time dictated by the simulation run you are processing. The dialog contains two slider controls and three buttons as shown:



X-Axis Range Dialog

Start Time: This slider control allows you to specify the starting time of the x-axis. This time must be less than the ending time specified for the axis.

Stop Time: This slider control allows you to specify the ending time of the x-axis. This time must be greater than the start time specified for the axis.

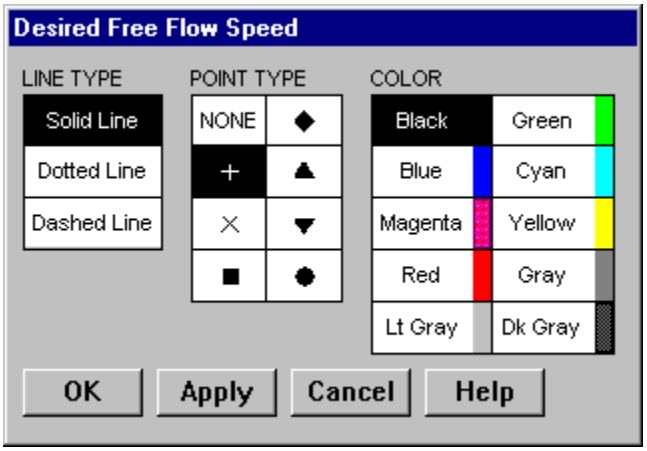
OK: This button accepts the specified times and closes the dialog. However, if the start time exceeds the stop time, you will not be able to exit this dialog with the **OK** button.

Cancel: This button closes the dialog without changing the x-axis range values.

Help: This button displays help text for the X-Axis Range dialog.

2.12.4.5 Plot Style Dialog

The following figure illustrates the Plot Style dialog. To activate this dialog, double click on a curve definition in the graph legend. From this dialog, you may change the color, line style, and symbol of the selected curve (indicated in the dialog's title bar). The dialog contains three selection grids and four buttons as shown:



Plot Style Dialog

Line Type: This selection grid allows you to specify one of three different line styles for the selected curve.

Point Type: This selection grid allows you to specify one of seven different symbols for the data points in the selected curve. You may also choose not to display data points for the curve.

Color: This selection grid allows you to specify one of ten different colors for the selected curve.

OK: This button accepts the specified curve attributes and closes the dialog.

Apply: This button accepts the specified curve attributes and leaves the dialog open.

Cancel: This button closes the dialog without applying any pending changes to the curve attributes.

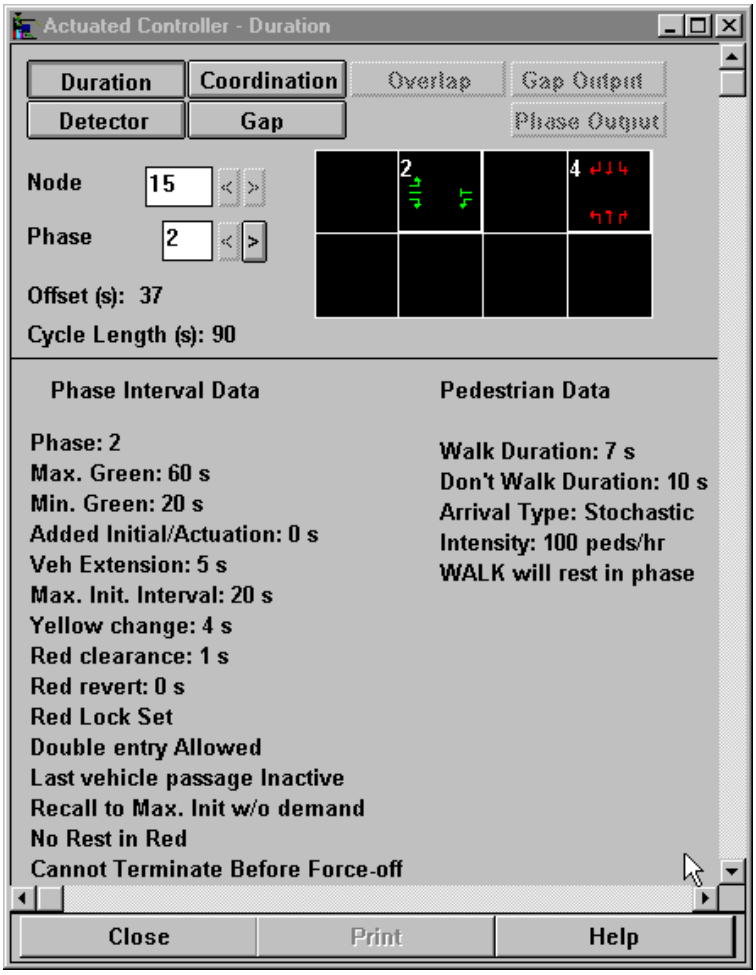
Help: This button displays help text for the Plot Style dialog.

2.13 Signal Controller Displays

Within CORSIM traffic is controlled by stop signs, yield signs, fixed-time signal controllers, actuated signal controllers, and ramp meters. While sign control operation is easy to understand, the signal control operations are more complex. TRAFVU provides specialized signal controller diagrams to help you analyze the operation of the CORSIM signal controllers. The following sections describe the use and features of these signal control diagrams.

2.13.1 Actuated Controller

The following figure illustrates the Actuated Controller dialog. You can activate this dialog by clicking either mouse button while the cursor is over an actuated signal head (round signal display) in the Network window. When activated, the controller dialog displays information for the controller associated with the signal head on which you clicked. However, once activated the controller dialog allows you to examine any actuated controller in the network by specifying the ID of the node at which the controller is located. Typically, all signal heads at an intersection are controlled by the same controller.



Actuated Controller Dialog

The Actuated Controller dialog displays the right-of-way at an intersection for each of the phases of the controller. This dialog always displays the controller ID (node ID at which the controller is located), phase, cycle length and offset. You may also toggle between seven additional displays and diagrams that characterize the operation of the controller. The following section briefly describes these displays.

Duration: This button activates the Duration display. The Duration display is the default display and specifies the interval and pedestrian (if available) data.

Detector: This button activates the Detector display. The Detector display provides information about all of the detectors associated with the specified controller.

Coordination: This button activates the Coordination diagram. The Coordination diagram displays the relationship of the force-off, yield point, and permissive period in a coordinated controller.

Gap: This button activates the Gap diagram. The Gap diagram displays the data that determine the gap reduction operation for the specified phase.

Overlap: This button activates the Overlap diagram. The Overlap diagram is a graphical display of phases that have overlapping movements.

Gap Output: This button activates the Gap Output diagram. The Gap Output diagram is a graphical display of the actuation and gap reduction steps taken at any given simulation time for a specified phase. You can view the data as a snapshot of a phase's activity for a specified time or as a dynamic display that updates during animation. (NOTE: this feature is not available in the current release).

Phase Output: This button activates the Phase Output diagram. The Phase Output diagram is a graphical display of the actuated control ring diagram and permissive period diagram. You can view the data as a snapshot of the phase's activity for a specified time or as a dynamic display that updates during animation. (NOTE: this feature is not available in the current release).

Node: This control indicates which controller is being displayed by the dialog. Controllers are identified by the node (intersection) they control. You may view other actuated controllers in the network by using the next (>) and previous (<) buttons located to the right of the node display or by typing in the node ID. You may also click on any of the signal heads at an intersection to display controller information for that intersection.

Phase: This control indicates which controller phase is represented by the displayed data. You may select a phase by using the next (>) and previous (<) buttons located to the right of the phase display, typing in the phase number, or clicking on the desired phase in the phase grid.

2.13.2 Fixed-Time Controller

The following figure illustrates the Fixed-Time Controller dialog. You can activate this dialog by clicking either mouse button while the cursor is over a fixed-time signal head (square signal display) in the Network window. When activated, the controller dialog displays information for the controller associated with the signal head on which you clicked. However, once activated the controller dialog allows you to examine any fixed-time controller in the network by specifying the ID of the node at which the controller is located. Typically, all signal heads at an intersection are controlled by the same controller.

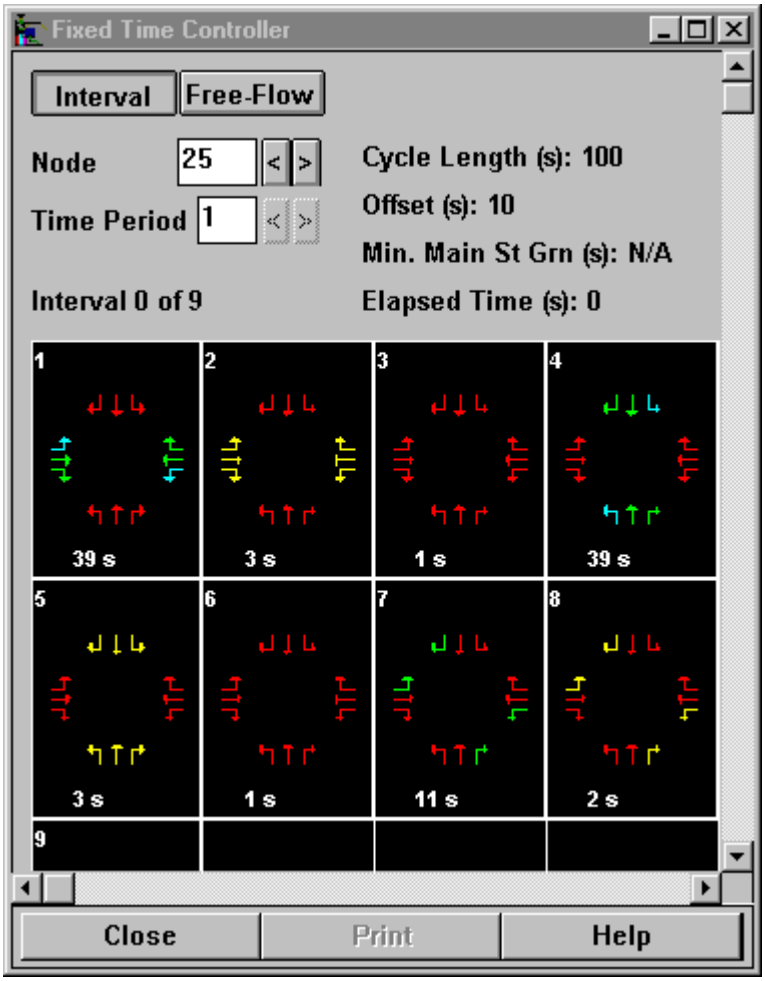
The Fixed-Time Controller dialog displays the right-of-way at an intersection according to the phasing defined in the simulation input (***.trf***) file. This dialog always displays the controller ID (node ID at which the controller is located), time period, cycle length, offset, minimum main street green time, current interval, and elapsed time for the interval. Additionally, you may toggle between two types of diagrams that characterize the operation of the controller: Interval diagram and Free Flow Diagram. These diagrams are described below.

Interval: This button displays the interval diagram. The interval diagram displays the signal indications for each of the pre-timed intervals (phases) and their duration. Green left-turn arrows indicate protected left turns and blue left turn arrows indicate permitted movements.

Free-Flow: This button displays the free-flow diagram. A free-flow diagram is a time-space diagram that displays the flow of traffic along an artery based on the specified green signal durations, intersection separation distance, and desired free-flow speed for each link in the artery. Nodes (intersections) controlled by semi-actuated controllers that are coordinated with the artery flow are also displayed in this diagram. Nodes under semi-actuated control are indicated by duration bars with vertical lines. Nodes controlled by fully-actuated controllers with zero cycle length are indicated by gray duration bars.

Node: This control indicates which controller is being displayed by the dialog. Controllers are identified by the node (intersection) they control. You may view other fixed-time controllers in the network by using the next (>) and previous (<) buttons located to the right of the node display or by typing in the node ID. You may also click on any of the signal heads at an intersection to display controller information for that intersection.

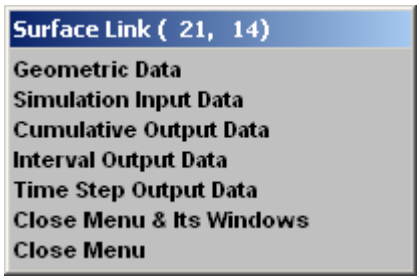
Time Period: This control indicates which time period is represented by the displayed data. CORSIM allows you to specify different controller timings for each time period in the simulation. You may select the time period by using the next (>) and previous (<) buttons located to the right of the time period display or by typing in the time period. Cycle length, signal indications, reference offset, and minimum main street green time are updated as you change time periods.



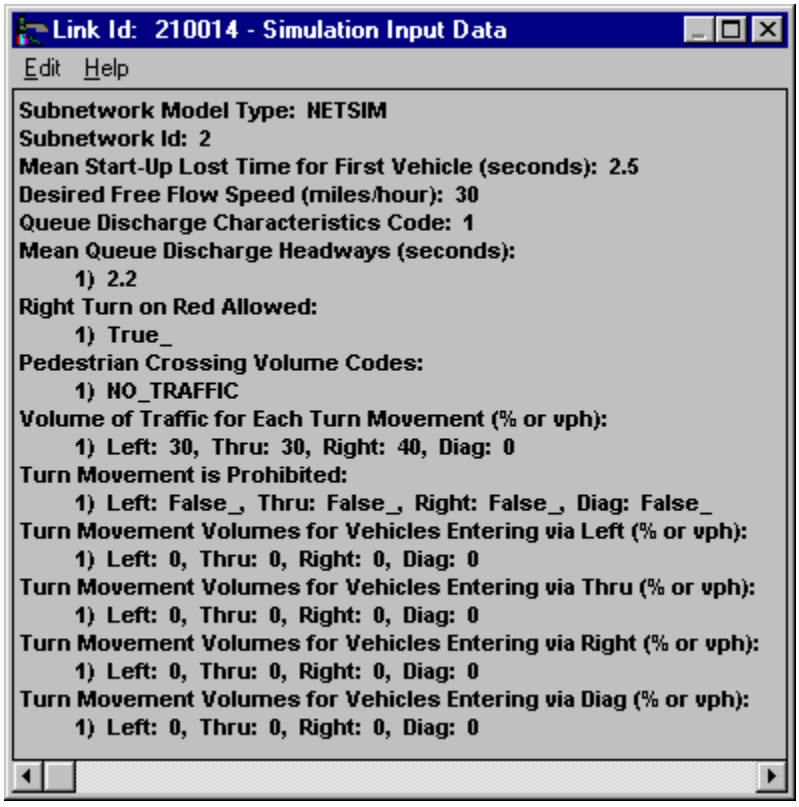
Fixed-Time Controller Dialog

2.14 Attributes

You may view the attributes for links, nodes, vehicles, signal heads, bus stations, bus routes, sensors, parking zones, and source/sink nodes by clicking on the object of interest with the right mouse button. For objects that have several categories of data (e.g., links) the right mouse click pops up the Attribute Menu dialog illustrated below. This menu displays categories of data that are available for the object. For links, the menu window displays the link ID in the title, a handy feature when trying to identify links in the network. When you click on a menu item with the left mouse button, TRAFVU displays the selected data in an Attribute Display window, as illustrated below. This sample window displays simulation input attributes for a surface-street link.



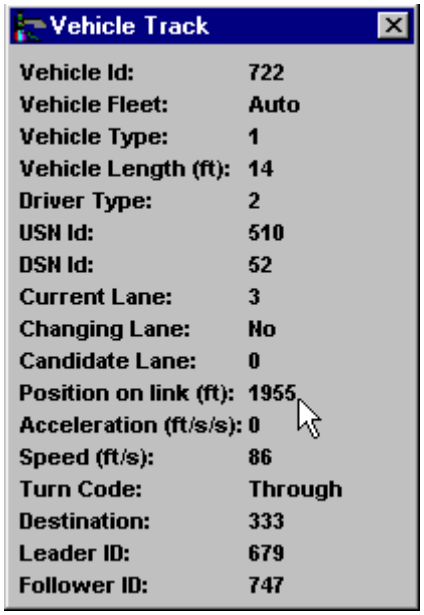
Attribute Menu Dialog


Link Id: 210014 - Simulation Input Data
Edit Help
Subnetwork Model Type: NETSIM
Subnetwork Id: 2
Mean Start-Up Lost Time for First Vehicle (seconds): 2.5
Desired Free Flow Speed (miles/hour): 30
Queue Discharge Characteristics Code: 1
Mean Queue Discharge Headways (seconds):
1) 2.2
Right Turn on Red Allowed:
1) True_
Pedestrian Crossing Volume Codes:
1) NO_TRAFFIC
Volume of Traffic for Each Turn Movement (% or vph):
1) Left: 30, Thru: 30, Right: 40, Diag: 0
Turn Movement is Prohibited:
1) Left: False_, Thru: False_, Right: False_, Diag: False_
Turn Movement Volumes for Vehicles Entering via Left (% or vph):
1) Left: 0, Thru: 0, Right: 0, Diag: 0
Turn Movement Volumes for Vehicles Entering via Thru (% or vph):
1) Left: 0, Thru: 0, Right: 0, Diag: 0
Turn Movement Volumes for Vehicles Entering via Right (% or vph):
1) Left: 0, Thru: 0, Right: 0, Diag: 0
Turn Movement Volumes for Vehicles Entering via Diag (% or vph):
1) Left: 0, Thru: 0, Right: 0, Diag: 0

Sample Attribute Display Window

These Attribute Display windows show static geometric and simulation input data that define the object. The Time Interval Output window displays interval-specific MOE data that are generated by the simulation at each simulation time interval as specified in the input file. The data in this window update automatically as the animation progresses.

The following figure illustrates a sample Attribute window that is displayed when you click the right mouse button on a vehicle. The data in this window update every simulation time step, allowing you to track the selected vehicle. Additionally, clicking on a vehicle flags the vehicle so you can track it as it moves through the network.



Vehicle Track Window

2.15 Window Preferences

From the Options|Window menu command, you can open a dialog that allows you to set, save, and recall preferences for the currently active Network window. You may also access this dialog by clicking the right mouse button while the cursor is in the window background (i.e., not over any selectable objects).

This dialog contains four tabs from which you can: select the color scheme and detail used to display vehicles during animation; select the background color of a Network window; set the properties for link text; and set the display state for several Network window components. Each of these tabs is described in detail in the following subsections.

The Preferences dialog contains six buttons used to apply, save, and recall window preferences:

OK: This button applies the specified preferences (on all tabs of the dialog) to the Network window and closes the dialog.

Apply: This button applies the specified preferences (on all tabs of the dialog) to the Network window and leaves the dialog open.

Cancel: This button closes the dialog without applying any pending preference changes.

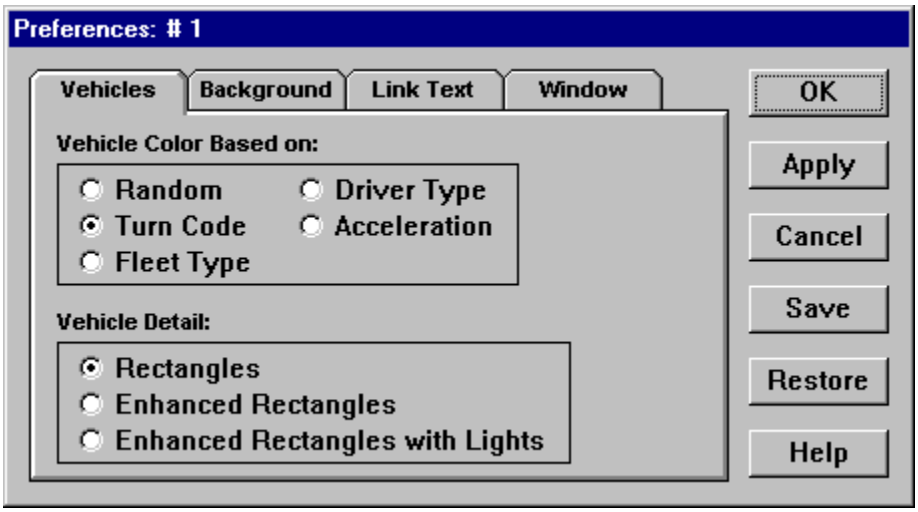
Save: This button saves the specified preferences to the system registry for the current user.

Restore: This button recalls the specified preferences from the system registry for the current user and applies those preferences to the Network window.

Help: This button displays help text for the Preferences dialog.

2.15.1 Vehicles Tab

The Vehicles tab, illustrated below, allows you to set the color and drawing detail for vehicles.



Vehicle Color and Detail

2.15.1.1 Vehicle Color

There are five schemes for assigning colors to vehicles:

Random Colors

When the Random Colors option is selected, vehicles are assigned colors randomly. This provides easier tracking of individual vehicles than the other color schemes. Additionally, this scheme makes the simulated vehicles look more realistic, which might be preferred for public presentations.

Color by Turn Movement

When the Color by Turn Movement option is selected, vehicles are color coded by their type of turn movement:

TURN MOVEMENT	COLOR
Left Turn	Green
Through	White
Right Turn	Yellow
Left Diagonal	Light Blue
Right Diagonal	Blue
Turn Code Error	Red

Color by Vehicle Fleet Type

When the Color by Vehicle Type option is selected, vehicles are color coded according to their fleet:

VEHICLE FLEET TYPE	COLOR
Auto	White
Truck	Green
Carpool	Yellow
Bus	Blue

Color by Driver Type (aggressiveness)

When the Color by Drive type option is selected, vehicles are colored according to their driver type. This is based on a scale from 1 to 10, where 1 is the least aggressive and 10 is the most aggressive:

DRIVER TYPE	COLOR
Type 1	Dark Blue
Type 2	Light Blue
Type 3	Dark Gray
Type 4	Light Gray
Type 5	White
Type 6	Dark Green
Type 7	Light Green
Type 8	Yellow
Type 9	Orange
Type 10	Magenta

Color by Acceleration

When the Color by Acceleration option is selected, vehicles are colored according to their acceleration

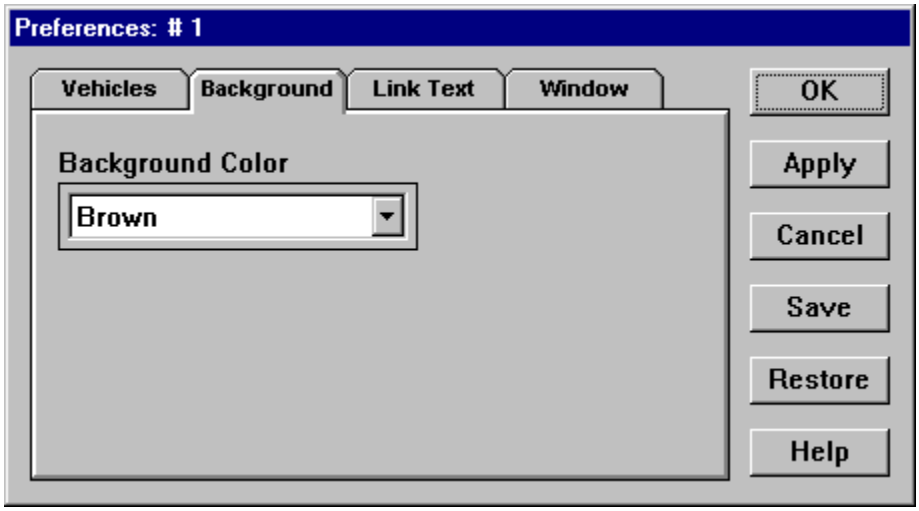
ACCELERATION TYPE	COLOR
Emergency deceleration	Orange
Deceleration	Yellow
No Acceleration	White
Acceleration	Green

2.15.1.2 Vehicle Detail

There are three levels of detail for vehicles. The first level, Rectangles, merely draws each vehicle as a rectangle. Enhanced Rectangles, the second level, provides a more realistic view of vehicles. The third level, Enhanced Rectangles with Lights, duplicates the features provided by the second level and adds turn signal lights that indicate the vehicles upcoming turn movement. Additionally, taillights illuminate to indicate deceleration, and headlights illuminate to indicate acceleration. Animation slows as you increase the vehicle detail.

2.15.2 Background Tab

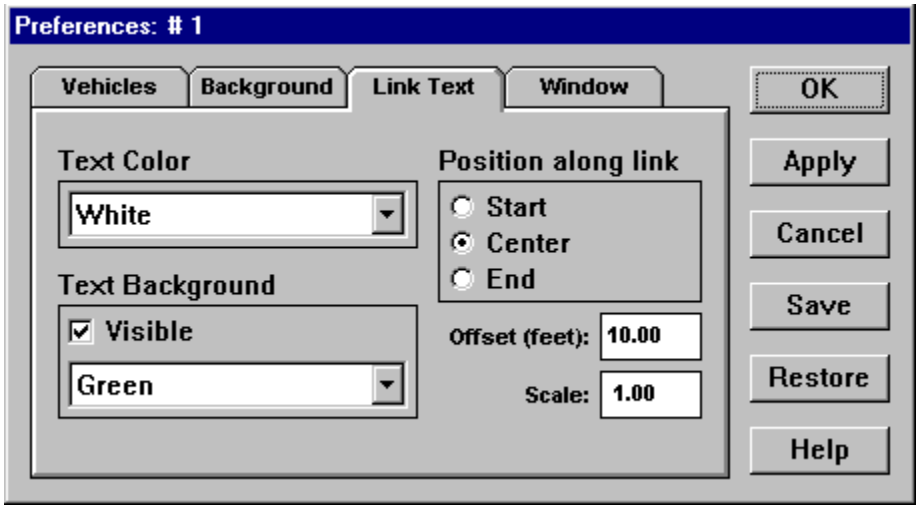
The Background tab, illustrated below, enables you to set the color of the Network window background. Select the desired color from the drop down list. This operation applies only to the selected window. You may want to set the background to white prior to printing the Network window. This increases the contrast of the printed image and saves print toner.



Background Color

2.15.3 Link Text Tab

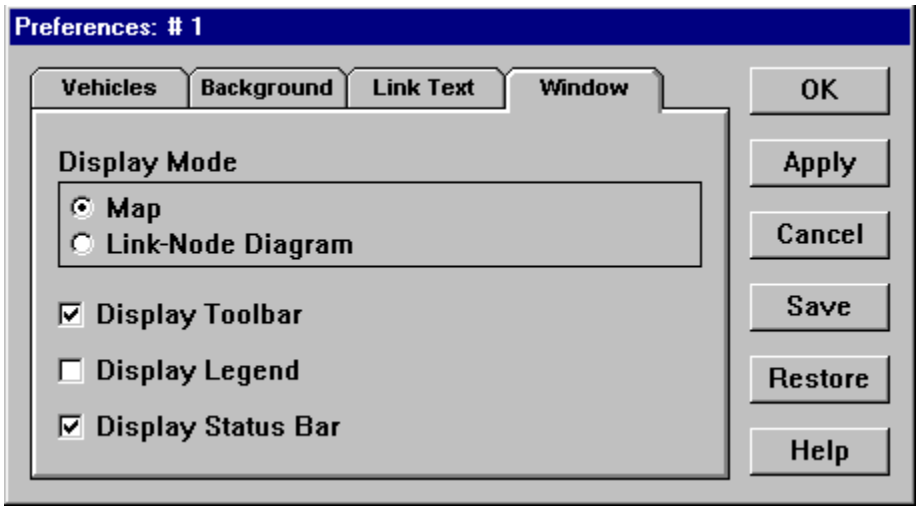
The Link Text tab, illustrated below, enables you to set the display properties of the text associated with links. Link text is displayed along a link, rotated to match the direction of the link. Using this tab, you can select the text color, the color of the text background, and whether the background is displayed. You can also specify the size of the text, its position along the link, and its offset from the link.



Link Text Properties

2.15.4 Window Tab

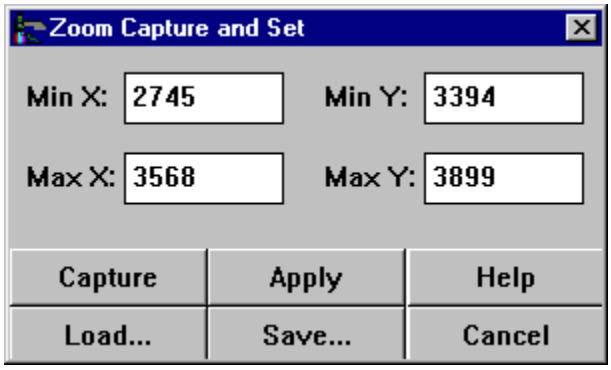
The Window tab, illustrated below, enables you to set the display mode of the Network window, either Map or Link-Node Diagram. From this tab, you can also set the display states of several Network window components: Toolbar, Legend, and Status Bar.



Window Properties

2.16 Zoom Capture and Set

The Zoom Capture and Set dialog enables you to set, save, and recall the size (zoom level) of a Network window. When displayed, this dialog lists the size of the currently active Network window in terms of X and Y coordinates. The dialog also contains a number of buttons, explained below, that allow you to set, save, and recall the size of the window. To display this dialog, either select the **Zoom Preset…** item under the View menu or press the **<Z>** shortcut key in the active Network window.



Zoom Preset Dialog

- **Capture:** This button allows you to capture the coordinates (or zoom values) of the current Network window. They can be saved and later recalled to return easily to the same view.
- **Apply:** This button allows you to apply the user-entered coordinates to the current Network window.
- **Help:** This button accesses the TRAFVU Help system to provide on-line help for this dialog.
- **Load…:** This button displays a file open dialog that enables you to load a previously saved coordinate file. If successfully loaded, this action applies the loaded coordinates to the current Network window.

- **Save…:** This button displays a file save dialog that enables you to save the current coordinates specified in the Zoom Capture and Set dialog to the specified file. The **Save** button does not apply those coordinates to the current window. If you want to apply the coordinates, you must use the **Apply** button.
- **Cancel:** This button ignores any value changes and closes the Zoom Capture and Set dialog. If your current view was changed after applying a set of coordinates, this view will remain the same even after **Cancel** has been used.

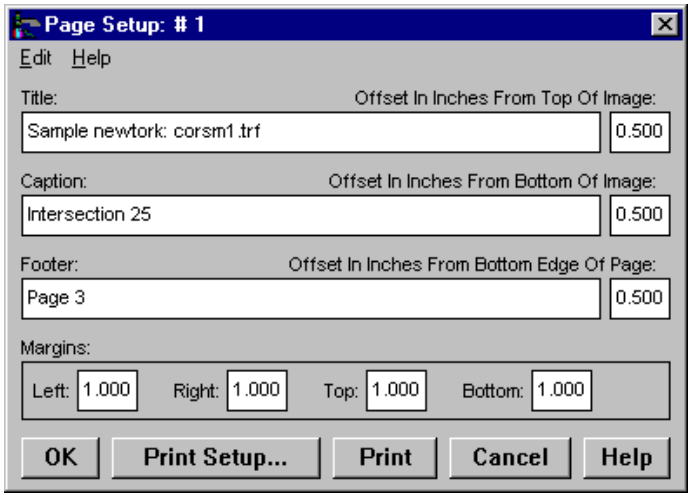
2.17 Printing

You may print the contents of a Network window by selecting Print under the File pull-down menu. You can specify the page margins using the File|Page Setup option. TRAFVU may ignore either the vertical or horizontal margin setting to maintain the aspect ratio of the network image. Page orientation (landscape or portrait) defaults to your system's default. However, you may specify the page orientation via the File|Page Setup option.

2.17.1 Page Setup

The Page Setup dialog, shown below, allows you to specify margins and add a title, caption, and footer to the printed image. TRAFVU centers the title, caption and footer strings.

You may enter a title of up to 50 characters in the "Title" field. The title is automatically defaulted to the name of the simulation input file. You can also specify the title's offset from the top of the printed image. For example, if you specify an offset of 2 inches, the bottom of the title string is printed 2 inches from the top of the image.



Page Setup Dialog

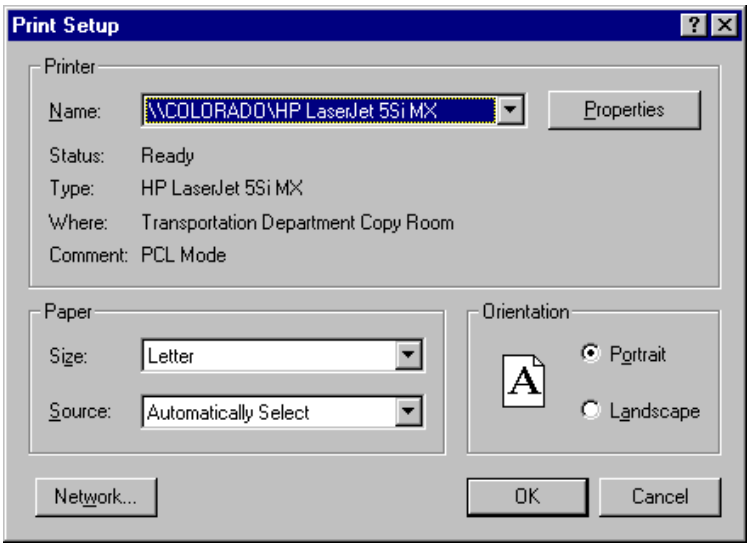
You may enter up to 50 characters in the "Caption" field. You can also specify the caption's offset from the bottom of the printed image. For example, if you specify an offset of 0.5 inches, the top of the caption string is printed 0.5 inches from the bottom of the image.

You may enter up to 50 characters in the "Footer" field. You can also specify the footer's offset from the bottom of the page. For example, if you specify an offset of 3 inches, the top of the footer string is printed 3 inches from the bottom of the page.

You may specify the left, right, top, and bottom margins within a range of 0 to 5 inches. Any entries outside of this range trigger a dialog box warning you that a value is out-of-bounds. If you do not specify margins, they default to 1 inch. To maintain the aspect ratio of the image, TRAFVU may adjust the top/bottom or left/right user-specified margins.

2.17.2 Print Setup

The Print Setup dialog is a standard dialog for setting the parameters of the default printer. The look and contents of the dialog depends on the make and model of your default printer. From this dialog, you can select landscape or portrait modes for your printed image.



Print Setup Dialog

2.18 Shortcut Keys

This section identifies the shortcut keys available in the TRAFVU application.

2.18.1 Pan/Zoom Shortcuts

In addition to the standard zoom functions provided in both the Network window tool bar and View menu, TRAFVU provides shortcuts to make adjustments to the zoom level.

Micro Zoom-In: Hold the **<CTRL>** key while pointing with the arrow cursor to a point on the map that will become the center of the zoomed-in view. Double click the left mouse button to activate the zoom-in. The updated view appears in the current window, i.e., a new window is not generated. Additionally, you may micro zoom in on the center of the network by pressing the **<Page Up>** key.

Micro Zoom-Out: Hold the **<CTRL>** key while pointing with the arrow cursor to a point on the map that will become the center of the zoomed-out view. Double click the right mouse button to activate the zoom-out. The updated view appears in the current window, i.e., a new window is not generated. Additionally, you may micro-zoom out on the center of the network by pressing the <Page Down> key.

Show Entire Network: Press the **<CTRL>+<PgDn>** keys to fit the entire network in the window.

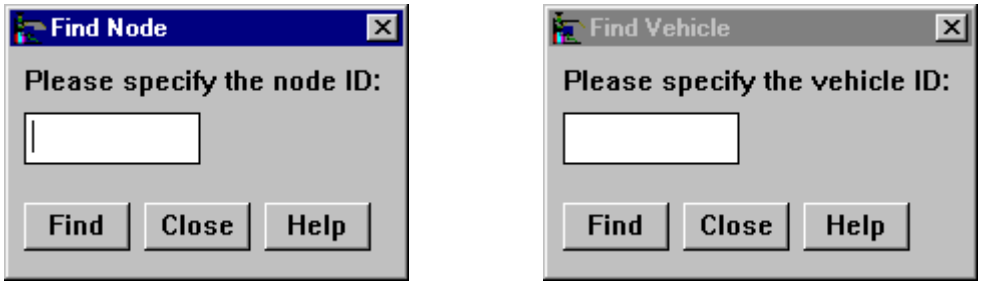
Zoom Capture and Set: Press the **<Z>** key to display the Zoom Capture and Set dialog. This dialog enables you to set, save, and recall a specific zoom level for a network display window.

2.18.2 Find Shortcuts

The following keys provide shortcuts to the find dialogs illustrated below:

Find Node: Press the **<N>** key in order to bring up the Find Node window.

Find Vehicle: Press the **<V>** key in order to bring up the Find Vehicle window.



Find Node and Find Vehicle Dialogs

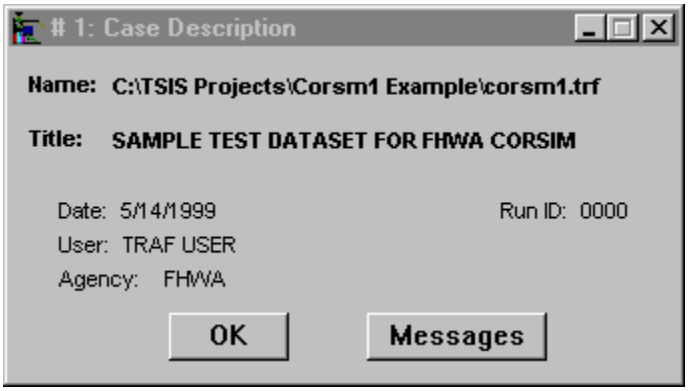
2.18.3 APC Shortcuts

You may access the APC functions without the mouse using the following accelerator keys. Letter keys are case insensitive, i.e., they operate with or without the Caps Lock enabled. Letter keys are active only when the Network window or APC dialog has focus. Arrow keys are active only when the APC dialog has focus.

APC SHORTCUT	DEFINITION
Space Bar	Toggles between Pause and Play
P	Play
R	Reverse
F	Single Step Forward
B	Single Step Backward
S	Reset to Start Time
T	Reset animation display speed to 1 frame/second
→	Increase animation delay
←	Decrease animation delay
<Shift> + →	Increase interpolation
<Shift> + ←	Decrease interpolation

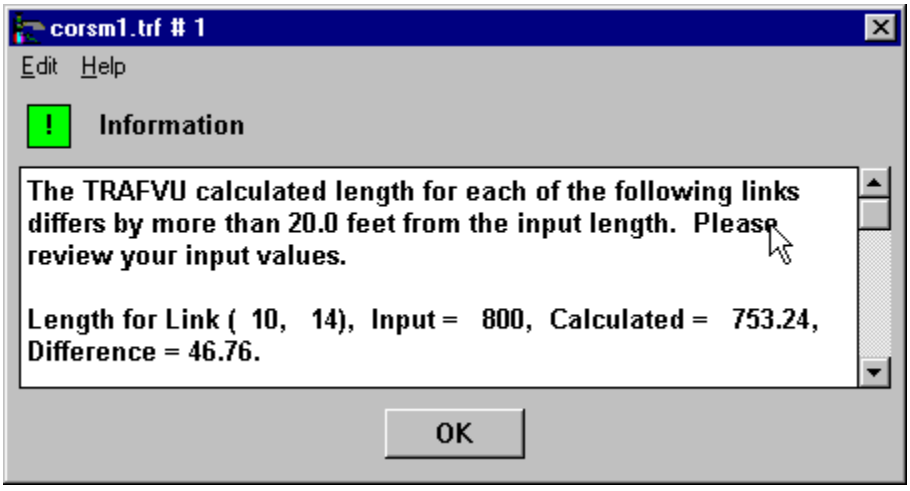
2.19 Case Description Dialog

The following figure illustrates the Case Description dialog that you may access via the Window|Case Description menu item. This dialog displays the user-supplied CORSIM information for the specified case.



Case Description Dialog

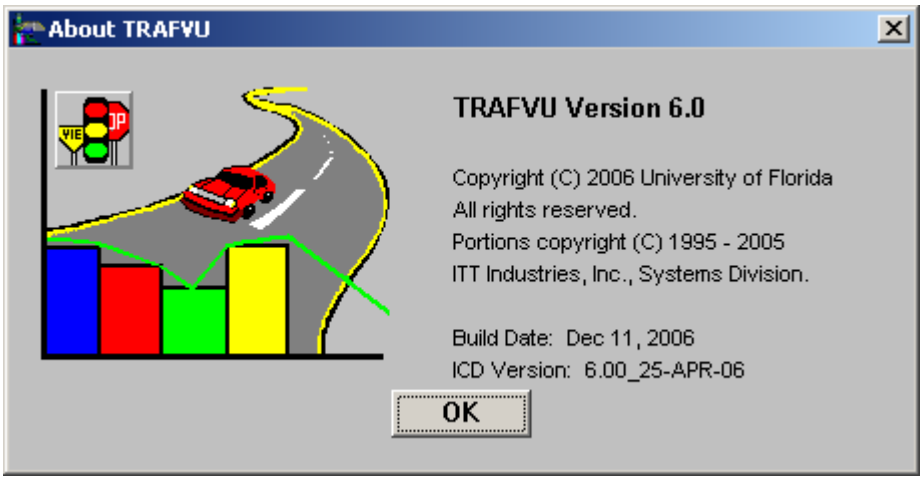
From this dialog, you may also access any information, warning, or error messages produced by TRAFVU during its initialization and loading of the specified case. The messages are displayed in a dialog, shown below, that allows you to view and copy the messages to the Windows clipboard. TRAFVU automatically displays the message dialog when the file is loaded if there are any warning or error messages produced.


corsm1.trf # 1
Edit Help
Information
The TRAFVU calculated length for each of the following links differs by more than 20.0 feet from the input length. Please review your input values.
Length for Link (10, 14), Input = 800, Calculated = 753.24, Difference = 46.76.
OK

Message Dialog

2.20 TRAFVU About Dialog

The TRAFVU About dialog, illustrated below, is accessed via the Help|About menu item. This dialog provides important information about the version of TRAFVU that you are using. Every release of TRAFVU has a unique Build Date, identified on this dialog. This dialog also lists the ICD version identifier used by this version of TRAFVU.



About Dialog

2.21 TRAFVU Help System

The Windows version of TRAFVU uses an HTML help facility that allows us to place the written User's Guide on-line, without having to modify the original document. This HTML help system uses your Internet browser to provide a powerful, flexible, hypertext-based help utility. Using the <**F1**> key you can obtain help on the contents of the window or dialog with focus. Additionally, the HTML help utility provides its own on-line help.

3 Tips and Troubleshooting

3.1 Introduction

This section briefly discusses the types of error and warning messages that you may encounter while executing TRAFVU. It also addresses issues involved in accurately representing your network in TRAFVU. Finally, this section lists known problems and addresses performance issues.

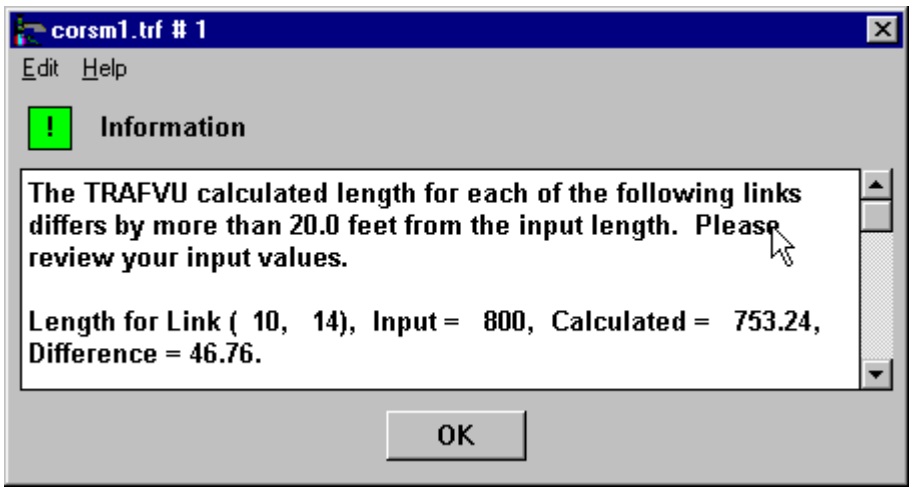
3.2 Error Processing

Many of the potential error and warning messages involve the data contained in the simulation input (***.trf***) file. Although TRAFVU checks many of the parameters that are inputs to CORSIM, it does not check all of them. It checks only those input data that it uses to draw the network and to animate vehicles and signals. Additionally, TRAFVU will accept and accurately display certain input data that CORSIM will reject. This behavior is by design and enables users to see potential problems before attempting to simulate a case. For example, TRAFVU will accurately draw an actuated controller detector that is incorrectly positioned into the upstream intersection, even though CORSIM will generate a fatal error message.

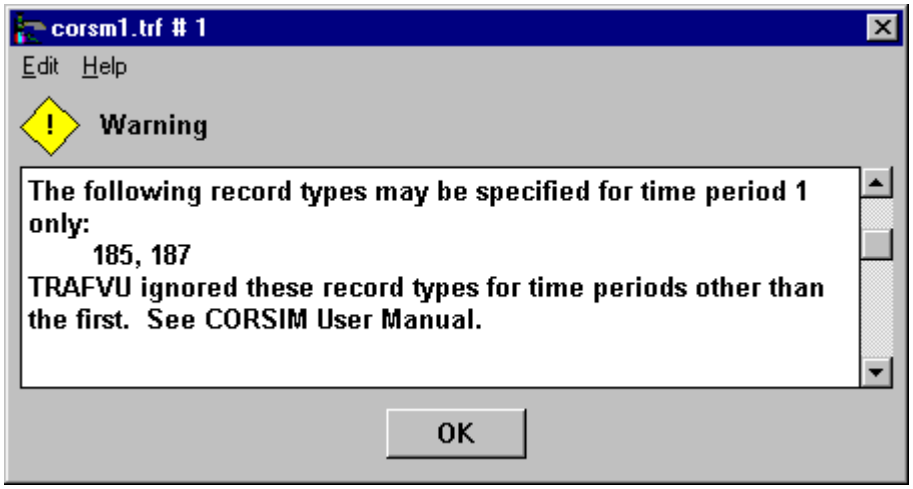
When processing input, TRAFVU may generate three different types of messages: information, warning, and error. Information messages provide information regarding the availability of output (animation) data and supplementary information about the simulation input. An example of this type of message, illustrated below, is the link length comparison message that TRAFVU generates for each link whose TRAFVU-calculated length differs from the input length by more than 20 feet. TRAFVU does not prompt the user and automatically display information messages. However, you can view these messages by pressing the Messages button in the Case Description window.

TRAFVU will create warning messages when certain input data are missing, out-of-range, or incorrectly specified. For example, TRAFVU will generate a warning message if the user places a record type that is restricted to time period one, in a time period other than the first. This particular warning message is illustrated below. TRAFVU automatically displays warning messages after the case is loaded. Although warning messages indicate a serious flaw in the input, they do not prevent TRAFVU from loading and displaying the network.

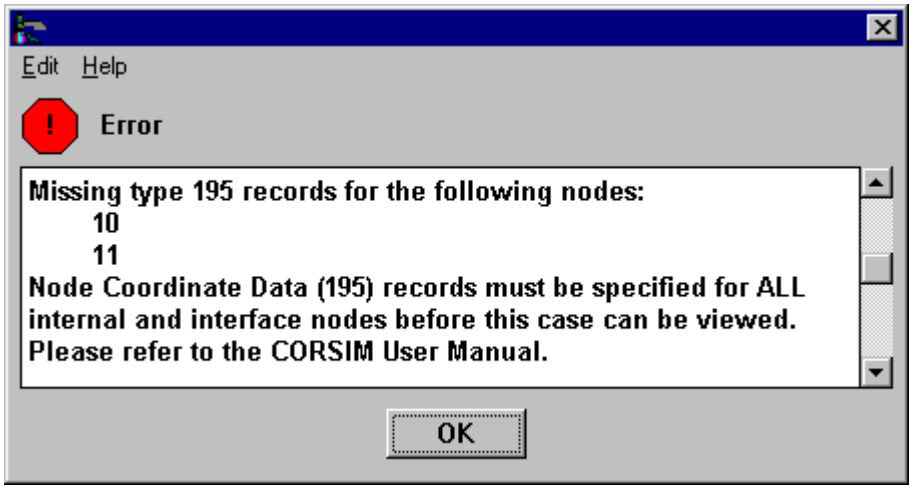
Finally, TRAFVU creates error messages for data input errors that prevent it from loading a network. A classic example of this occurs when a ***.trf*** input file does not contain a record type 195 for each node in the network, as illustrated below. Missing node locations prevent TRAFVU from drawing the network. TRAFVU automatically displays error messages.


corsm1.trf # 1
Edit Help
Information
The TRAFVU calculated length for each of the following links differs by more than 20.0 feet from the input length. Please review your input values.
Length for Link (10, 14), Input = 800, Calculated = 753.24, Difference = 46.76.
OK

Information Message Dialog

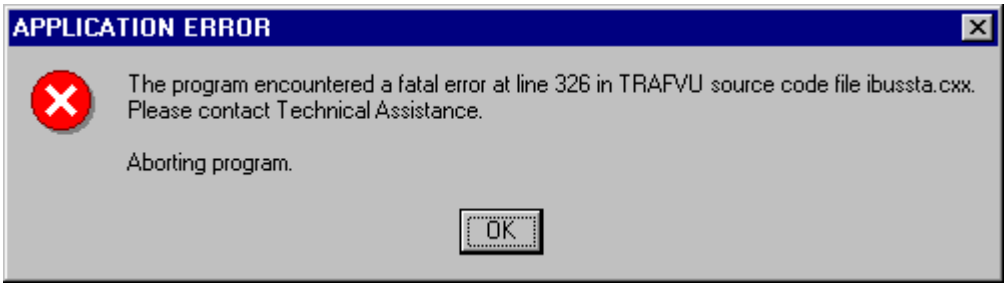

corsm1.trf # 1
Edit Help
Warning
The following record types may be specified for time period 1 only:
185, 187
TRAFVU ignored these record types for time periods other than the first. See CORSIM User Manual.
OK

Warning Message Dialog


Edit Help
Error
Missing type 195 records for the following nodes:
10
11
Node Coordinate Data (195) records must be specified for ALL internal and interface nodes before this case can be viewed.
Please refer to the CORSIM User Manual.
OK

Error Message Dialog

TRAFVU also handles some unexpected low-level fatal errors. This type of error can occur when assumptions used in the coding of TRAFVU fail. For example, TRAFVU assumes that in specifying record types in time periods other than time period one, the user has specified more than one time period in record type 3. If not, TRAFVU generates a fatal assertion error. An assertion error produces a message, as illustrated below, and terminates the TRAFVU program. The message provides the name of the source code file and line number in that file where the error was generated. We provide assertion checking as a last chance effort to keep TRAFVU from aborting at a later point in the code without any indication of a problem. Our intent is to keep assertion errors to a minimum, however, if they do occur, we ask you to contact technical assistance so that we may provide guidance on how to prevent the error and correct the program as necessary.


APPLICATION ERROR
The program encountered a fatal error at line 326 in TRAFVU source code file ibussta.cxx.
Please contact Technical Assistance.
Aborting program.
OK

Assertion Error Dialog

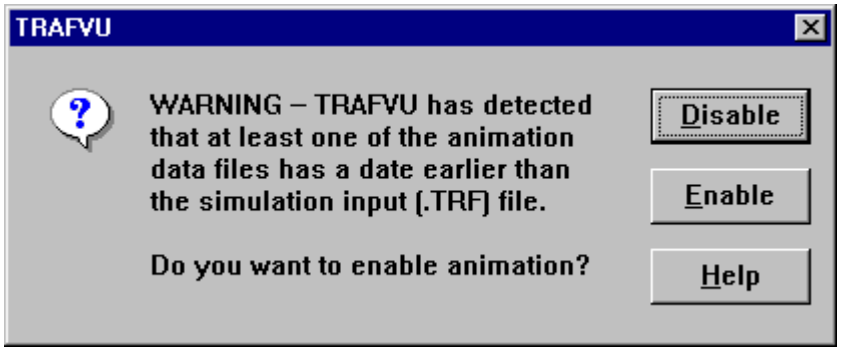
The following sections describe several common error messages you may encounter and provide corrective actions you can take to eliminate the errors. In most of the descriptions, the error text is provided without including the actual dialog to save space.

3.2.1 Errors Associated with the .trf Input File

The following warning and error messages concern the CORSIM input (***.trf***) file.

3.2.1.1 WARNING: File Out-Of-Date

The following warning dialog may appear immediately after you select a case to open. The most likely cause of this condition is that the simulation input (***.trf***) file was changed after the simulation was run.


TRAFVU
WARNING – TRAFVU has detected that at least one of the animation data files has a date earlier than the simulation input (.TRF) file.
Do you want to enable animation?
Disable
Enable
Help

Some changes to the input file, e.g., comment lines, have no effect on the animation. However, changes to the network, e.g., deleting a link, will cause TRAFVU to terminate with an error during animation.

If you select **Disable**, TRAFVU will load the case but you will not be able to animate vehicles, signals, nor MOE. If you select **Enable**, TRAFVU will load the case and will allow you to animate. However, inappropriate changes to the simulation input file may cause TRAFVU to terminate in error during animation. If you have made any physical characteristic changes to the network (including signals) after running the simulation, please re-run the simulation.

Changes to the simulation input file that do not require re-running the simulation include: the addition, deletion, or editing of comment cards, and changes to the 195 and 196 cards. For example, you may change the underpass/overpass relationship between links using the 196 card without re-running the simulation.

3.2.1.2 ERROR: Could Not Open the Simulation Input File

```
TRAFVU could not open the Simulation Input file:
     <filename>.
```

TRAFVU issues this message if it can not open the CORSIM input (***.trf***) file. This may occur if the CORSIM input (***.trf***) file is corrupt or if there is a problem with the computer's operating or file system.

3.2.1.3 ERROR: Missing Type 195 Records

```
Missing type 195 records for the following nodes:
     10
     11
Node Coordinate Data (195) records must be specified
for ALL internal and interface nodes before this case
can be viewed.  Please refer to the CORSIM User Manual.
For input files with node coordinates specified on type
35 or 43 records, please use TRAFUpdate to Automatically
create 195 records.
```

To draw the network prescribed by the CORSIM input (***.trf***) file, TRAFVU must have the coordinates of all internal and interface nodes in the network. You must specify node coordinates using record type 195 (see CORSIM User Manual).

3.2.1.4 ERROR: Missing Records

```
Missing the following records:
     1
     2
     3
     4
     5
   170
   210
Without these records, this case does not
meet the minimum network coding requirements
for CORSIM or TRAFVU.  Please refer to the
CORSIM User Manual.
```

You did not specify all of the required records to successfully execute a case. The minimum coding requirements are specified in the CORSIM User Manual.

3.2.2 Error Messages Associated with Other Files

The following file error messages can occur for all files that contain input data for TRAFVU. The example error messages involve the Time Step Data (***.tsd***) file; however, the messages and suggested solutions apply equally to the following animation data files: Time Step Index (***.tsi***), Time Interval Data (***.tid***), and Time Interval Index (***.tii***).

3.2.2.1 ERROR: Could Not Find or Open the Time Step Data File

```
TRAFVU could not find or open the Time Step Data
file, <filename>.  Please re-run the simulation
and make sure it completes successfully.  If you still
get this error, please contact Technical Assistance.
```

TRAFVU could not open the Time Step Data (***.tsd***) file produced by CORSIM. Be sure that CORSIM successfully executed. This error may occur if the computer's operating or file system is corrupt.

3.2.2.2 ERROR: Incorrect Version of the Time Step Data File

```
The version of the Time Step Data file,
<filename>, is no longer supported by TRAFVU.
Please re-run the scenario with the appropriate
version of TSIS-CORSIM.  If you still get this
error, please contact Technical Assistance.
```

TRAFVU is attempting to use an outdated file. Re-run the case through the simulation. If you still get this error, make sure you have matching versions of CORSIM and TRAFVU.

3.2.2.3 ERROR: Error While Reading the Time Step Data File

```
TRAFVU has encountered an error while reading
the Time Step Data file, <filename>.
Please re-run the simulation and make sure it
completes successfully.  If you still get this
error, please contact Technical Assistance.
```

TRAFVU is attempting to use a corrupt or incomplete Time Step Data (***.tsd***) file. Re-run the case through the simulation. If the case still does not load properly, consult the CORSIM Record Types Reference Manual.

3.2.2.4 ERROR: Unexpected End of File

```
TRAFVU has encountered an unexpected end-of-file
while reading the Time Step Data file,
<filename>.  Please re-run the simulation and make
sure it completes successfully.  If you still get
this error, please contact Technical Assistance.
```

TRAFVU is attempting to use an incomplete Time Step Data (***.tsd***) file. Re-run the case through the simulation. If the case still does not load properly, consult the CORSIM Record Types Reference Manual.

3.2.3 Errors Associated with Concurrently Running TRAFVU and TSIS

Finally, if you are running TRAFVU concurrently with CORSIM, you may encounter the following warning:

3.2.3.1 WARNING: End-of-File While Reading the Time Step Data File

```
TRAFVU has encountered an end-of-file while
reading the Time Step Data file, <filename>.
If you are running the simulation concurrently
with TRAFVU, please wait until the simulation
has generated more data, or slow the animation
rate by increasing the frame delay or interpolation.
If you are not running concurrently, please re-run
the simulation and make sure it completes successfully.
```

In this situation, press the **OK** button on the error dialog and wait for the simulation to generate more data. You may want to slow the animation by adding some frame delay or adding some interpolation. Alternatively, you may start TRAFVU with the -c command line option, the recommended setting for concurrent operation.

3.3 Link Drawing Considerations

Two distinct sources of information affect the look of your network as depicted by TRAFVU: roadway specifications that form the input to CORSIM, and rules (assumptions and connection logic) used by TRAFVU. CORSIM was initially developed without graphics or animation support. Therefore, CORSIM uses a minimal amount of geometric and roadway connection information, just enough to support the simulation. As CORSIM evolved and graphics support was added, the input to CORSIM was minimally upgraded to

support graphics. Needless to say, the current set of CORSIM input is insufficient to fully describe the look of a network.

To compensate for missing geometric input, TRAFVU applies a set of rules to connect roadways and draw a network. However, ambiguities still exist under certain situations. To compound drawing problems, past versions of TRAFVU did not fully or consistently use even the small amount of geometric information provided by CORSIM input. Thus, a user could move a node to a new location or could change the length of a link without seeing an appropriate change in the network drawing. In some situations, a user had to enter locations or lengths that did not make sense to achieve a reasonable look for the network.

With version 6.0, we have modified the drawing logic within TRAFVU to be more robust, and to afford the user more control in defining the look of the network, particularly with regard to roadway curvature and intersection connections. Version 6.0 uses all of the geometric information provided by CORSIM input, including consistent use of the curvature code for both surface-street and freeway links and consistent placement of the left curb of a link on its specified nodes. We have also added a new input parameter that allows the user to control the minimum radius of curvature for roadway drawing. With version 6.0, reasonable input values yield reasonable looking networks.

Because of these changes, your networks, that you developed with previous versions of TRAFVU, may not draw properly in version 6.0. To achieve control, consistency, and reasonableness in network drawing, this side effect could not be avoided and we are sorry for any inconvenience it may cause.

Furthermore, there are still some ambiguous situations in which TRAFVU cannot properly resolve intersection connections. This is a result of the lack of sufficient information provided by CORSIM input. However, in the following paragraphs, we describe some of the rules TRAFVU applies and attempt to provide some guidance in specifying roadways in hopes of alleviating the majority of your network drawing problems.

3.3.1 Freeway Links

In drawing and connecting freeway links, TRAFVU applies several rules in addition to using the link length and curvature code you supply. First, TRAFVU places the left curb line of the link on the nodes at both ends of the link. Furthermore, lengths are measured along the left curb line. By using the left curb, you can more easily place opposing direction freeway links adjacent to each other. Second, TRAFVU will always connect freeway links in such a way that the connection is smooth, i.e., TRAFVU does not connect freeway links at an angle. Thus, even though you may specify a link to be straight, TRAFVU might add a small curve at either end of the link to connect the link smoothly at the node. Keep in mind, the actual shape of the link is affected by its curvature code, length, node locations, and the direction at which connecting links connect at the nodes.

For curved links or when adding curves to a straight link to achieve a smooth connection, TRAFVU might use curves with very small radius of curvature in order to meet the specified length. With version 6.0, however, you can specify, by link, the minimum radius of curvature TRAFVU will use in creating curves on a link. Increasing this minimum value allows you to create more realistic curves although, in some cases, sacrificing the closeness of match between the actual and specified lengths.

TRAFVU attempts to honor the length of the link that you supply. Although version 6.0 does a much better job at using the supplied length, there are situations when the supplied link length is modified. Whenever you specify a link to be straight, TRAFVU will use the node-to-node distance as a starting point and modify it as necessary to meet the smooth join criterion. The resulting length will not match your supplied length if the supplied length is much different than the node-to-node distance. In situations where the actual length varies from the supplied length by more than 20 feet, TRAFVU records the variance as an information message. In these situations, you should change your specified link length to match the TRAFVU-prescribed length to prevent vehicle placement problems during animation. Note, both the input length and the actual length used by TRAFVU are also displayed in the link's geometric data attribute display.

For curved links, TRAFVU attempts to match the length you supply by changing the radius and length of the curves it adds to the link. TRAFVU first attempts to put a single curve on the link to achieve the length. If that fails, TRAFVU will add two curves joined by a straight section. In either case, TRAFVU will enforce the smooth join criterion. For extremely excessive specified lengths, TRAFVU may place a loop in the link in an attempt to match the specified length. In such situations, you should reduce the specified length and review the

node placement. As with straight links where the actual length varies from the supplied length by more than 20 feet, TRAFVU records the variance as an information message.

In general, specifying reasonable node locations and link lengths yields a network that looks reasonable. However, there are some situations in which you will need to modify node locations and link lengths to attain the desired curve shapes. Also, there are still a few situations in which TRAFVU cannot correctly draw the desired curve shape, especially when the link is very wide. In some situations, you may need to break a link into smaller segments to achieve the desired curve shape.

3.3.2 Surface-Street Links

For surface-street link connections that involve only two links, the rules that are used to draw freeway links are applied to drawing the surface streets. However, when more than two surface-street links are joined, TRAFVU creates an intersection. At an intersection, TRAFVU does not apply the smooth join criterion used in connecting freeway links. It also attempts to minimize the extent of the intersection by pulling back the links only far enough to prevent them from overlapping. As with freeway links, TRAFVU places the left curb (or the extension of the left curb) of all connecting links on the node at the intersection. One problem with this logic is that when a link joins the intersection at a shallow angle, the intersection can become quite large. In some cases, the user's intent is not to have the link join at an angle but rather to have it join the intersection in alignment with another connecting link, yielding a smooth join. However, this information is not provided for in the CORSIM input, leaving TRAFVU to attempt to determine what the user intended.

Another ambiguity arises with the alignment of lanes in the upstream link for non-through links. The CORSIM input does not specify these upstream link alignments.

When specifying link lengths, it is important to remember that the CORSIM input uses the stop bar to stop distance for the link length. You must account for the intersection crossing distance when specifying the length for links that connect at an intersection. This is particularly important for short links and when the cross connecting links are wide. Failure to account for the intersection crossing distance is the source of may drawing and animation problems in TRAFVU.

Because TRAFVU defines a link the same way CORSIM does, a mismatch between the input length and the TRAFVU length will cause mismatch between the link storage as simulated by CORSIM and the link storage displayed by TRAFVU.

3.4 Known Problems

At the time of this release, TRAFVU has the following known problems:

- When specifying lane widths using the type 80 record, TRAFVU applies the lane 1 width to all lanes on the link.
- Occasionally, the line graphs generate font errors that cause TRAFVU to fail.
- TRAFVU does not display information for input data that vary within a time period (see discussions for record types 23 and 53 in the CORSIM User Reference Manual).

3.5 Performance Issues

In processing case scenarios containing large networks, CORSIM generates large amounts of data. In particular, large networks generally contain many vehicles. The larger the network and the greater the number of vehicles, the more computer resources TRAFVU needs to animate the case. Additionally, TRAFVU animates slower when processing multiple simulation runs. You may try the following suggestions to improve the animation speed in TRAFVU:

- Close all Windows applications except TRAFVU.

- Reduce the number of windows in which you are animating data. You may turn off vehicle animation in a window by toggling off the vehicle button in the window's tool bar.
- Reduce or stop interpolation.
- Zoom in on the section of a network you are interested in. The fewer network links in a window, the faster the animation.
- Decrease the resolution of the screen. Driving the screen at a resolution of 1280 x 1024 can significantly slow the animation when compared to a screen resolution of 1024 x 768. Also, the use of a smaller number of colors (e.g., 256) can significantly increase animation speed.
- Ensure that your system meets the hardware requirements as outlined in the TSIS User's Guide.

4 Glossary of Terms

4.1 General Terms

Accelerator Key

Accelerator keys (also known as shortcut keys) are used as keyboard shortcuts for program commands that are also available on a menu or toolbar.

Actuated Controller

A device used to control traffic at an intersection. It uses detectors to determine the presence or passage of vehicles on the approaches to the intersection. That information is used to set the timing of the signal indications at the intersection.

Aggressiveness

In CORSIM, driver aggressiveness affects how drivers behave in lane changing, entering roadways, and in other driving maneuvers. Aggressiveness is based on a scale from 1 to 10, where 1 is the least aggressive and 10 is the most aggressive.

Animation Time

The time of day associated with each time step in the simulation. Same as simulation time.

APC

Animation Playback Control. This refers to the TRAFVU dialog used to control animation playback including the specification of interpolation.

Artery

A major traffic route (composed of multiple links) into which local routes flow.

ATMS

Advanced Traffic Management Systems

Case

A single simulation for a specified traffic network as defined by its simulation input file. A case includes the simulation input file and all data files generated by the simulation during a run. Note, multiple runs of the simulation for gathering statistics is still considered part of a single case if the input has not changed.

Coordination Diagram

A actuated controller diagram that displays the relationship of the force-off, yield point, and permissive period in a coordinated controller.

CORSIM

CORridor SIMulation. This is a microscopic traffic simulation used to generate the vehicle information used by TRAFVU.

Current Time

The time of day for the current state (time step) of the network during animation.

Cycle Length

The total time for a signal to complete one cycle. For fixed-time controllers, the cycle length (in seconds) is the sum of all interval durations. For actuated controllers, it is the length (in seconds) of the background cycle specified for a coordinated signal system.

Data Point

A point in time at which the traffic simulation records the state of vehicles and traffic controls.

Data Station

A location along a freeway at which headway and speed statistics are collected across all lanes.

Delay Time

A measure (in seconds per frame) of the amount of frame delay during animation.

Desired Free-Flow Speed

The speed (in miles per hour) attained by traffic in the absence of any impedance due to other vehicles, pedestrians, or control devices.

Detector

A sensor that records the presence or passage of a vehicle and is used to provide input to actuated controllers.

Detector Display

A actuated controller display that provides information about all of the detectors associated with the specified controller.

DOT

Department of Transportation

Driver Type

Driver type is a CORSIM parameter that ranges from 1 to 10 and specifies driver aggressiveness, where 1 is the least aggressive and 10 is the most aggressive.

Duration Display

An actuated controller display that indicates the interval and pedestrian (if available) data.

Dynamic Scrolling

With dynamic scrolling, the contents of a window scrolls as the user moves a scroll bar thumb.

Elapsed Time

During operation, the time (in seconds) that has expired for the current interval of a fixed-time controller.

FHWA

Federal Highway Administration. Sponsor for the development of the TSIS suite of traffic analysis tools.

Fixed-Time Controller

A device used to control traffic at an intersection. It uses pre-configured timing plans to set the cycle length, phases, green times, and change intervals. Thus, each cycle of operation is the same for a given plan.

Fleet

A CORSIM vehicle classification that includes: bus, car, truck, and carpool.

Force-off

A force off causes an actuated controller to terminate the active phase and go to the next phase requesting the right-of-way. The force-off point is the time during the background cycle at which a phase must terminate.

Frame

A snapshot of the vehicles and signals on a traffic network at an instant in time. Animation is the display of consecutive frames in time. Frame spacing is nominally equal to the simulation time step.

Frame Delay

Delay (in seconds per frame) added between each animation update. This feature is used to slow animation for easier viewing.

Free-Flow Diagram

A time-space diagram that displays the flow of traffic along an artery based on the specified green signal durations, intersection separation distance, and desired free-flow speed for each link in the artery.

Freeway

A high-speed roadway without intersections and having controlled entry and exit points. Within the CORSIM simulation, freeway links and their operational characteristics are specified separately from surface-street links. In TRAFVU, freeway links are colored gray.

Fully-Actuated

Under fully-actuated control, all actuated control phases have associated detectors.

Gap Diagram

An actuated controller diagram that displays the data that determine the gap reduction operation for the specified phase.

Gap Output Diagram

An actuated controller diagram that displays the actuation and gap reduction steps taken at any given simulation time for a specified phase. You can view the data as a snapshot of a phase's activity for a specified time or as a dynamic display that updates during animation.

Gap Reduction

For actuated control, the reduction of the allowable headways (gap) between vehicles from a maximum specified value to a minimum specified value over a specified amount of time.

Green Signal Duration

The length of time a signal indication for a specified movement remains green.

GUI

Graphical User Interface

HOV

High Occupancy Vehicle. This term is generally used to describe roadway lanes (facilities) that are reserved for vehicles that contain more than one occupant.

HTML

Hypertext Markup Language is a system of marking up or tagging a document so that it can be published on the World Wide Web. It is used to display TRAFVU on-line help.

ICD

Interface Control Document. The TReL Graphics Processor Interface Control Document (ICD 5.0) describes the interface between TRAFVU and the TReL traffic simulator. It also forms the basis for the structure of the TRAFVU animation files.

Incident

An event that impedes traffic in one or more lanes for a specified length of time.

Interpolation

The generation of additional vehicle states between CORSIM data points to improve the quality and smoothness of animation. Interpolation is measured in frames per time step.

Intersection separation distance

The distance between intersections along an artery.

Interval

A period of time during which all signal indications remain constant.

Interval Diagram

A fixed-time controller diagram that displays the signal indications for each of the pre-timed intervals (phases) and their duration.

Link

A simulation object that is an inter-node connection. It represents a segment of a roadway and is used to collect traffic flow statistics (MOE).

Link/Node Diagram

A diagram that illustrates the network layout as a web of interconnected nodes where links represent roadway segments and nodes represent roadway connections.

LOS

Level (or Levels) Of Service.

Micro Zoom

A feature used to zoom in or out on the network by a small amount. It is implemented by the **Page Up** and **Page Down** accelerator keys.

Microscopic Traffic Simulation

A traffic operations simulation in which individual vehicles and signal states are modeled.

MOE

Measure of Effectiveness. One of several statistics, generated by the simulation, that indicates the state of traffic flow within the network.

MOE Animation

In TRAFVU, link color can be set to represent a user-specified MOE and can be animated such that the link color changes with time as the corresponding MOE changes in time.

Node

A simulation object that represents a connection point for links and defines the layout of a traffic network.

Object

An object is an instance of any of the roadway, traffic control, or vehicle elements displayed by TRAFVU.

Offset

Amount of time (in seconds) until signal interval 1 begins. Offset provides a means for synchronizing fixed-time signals within the network.

Overlap Diagram

An actuated controller diagram that provides a graphical display of phases that have overlapping movements.

Overlapping Movements

Multiple, but not conflicting, movements during a phase, e.g., RTOR and opposing through traffic.

Permissive Period

A period in which an actuated controller can answer calls for phases other than its sync phases.

Permitted Movement

Left turn movements at a signalized intersection can be either permitted or protected. A left turn is permitted when the intersection allows a left turn to occur when the opposing through traffic signal indication is green.

Phase

Part of a cycle allocated to any combination of traffic movements receiving the right of way simultaneously during one or more intervals.

Phase Output Diagram

An actuated controller diagram that provides a graphical display of the actuated control ring diagram and permissive period diagram. You can view the data as a snapshot of the phase's activity for a specified time or as a dynamic display that updates during animation.

Pre-Timed

See fixed-time.

Protected Bus Station

A bus station that has its own pull-out lane so that it does not block traffic while loading or unloading.

Protected Left Turn

Left turn movements at a signalized intersection can be either permitted or protected. A left turn is protected when the intersection provides a phase in which the left turn is serviced without opposing movements being serviced.

Ramp

A segment of roadway used by vehicles to enter or exit a freeway.

Ramp Meter

A traffic control placed on a freeway entrance ramp to control the flow of traffic onto the freeway.

Reaction Point

The distance along a roadway at which vehicles (drivers) begin to react to specified roadway changes or events. See warning sign.

Real Time

During animation, the actual amount of time taken to display each second of animation time. When animation is set such that each second of animation time is displayed at a rate of one second, it is said the animation is operating at real time.

RTOR

Right Turn On Red

Rubber-Band Box

An area, represented by a dashed rectangle, that the user can create and size with the mouse to indicate an area on the network map which will fill the viewing area.

Semi-Actuated

Semi-actuated control exists when some actuated control phases do not have associated detectors.

Shortcut Key

See accelerator key.

Signal Head

A view object in TRAFVU that displays the signal indications for a controller at a controlled intersection or for a ramp meter.

Simulation Time

The time of day associated with each time step in the simulation. Same as animation time.

Simulation-Concurrent

Animation in TRAFVU while the simulation is still running and generating animation data.

Source/Sink

A source/sink is a mid-link (internal) traffic generator. Source/sink locations represent only net volumes; therefore, are best for representing places with flow that occurs predominantly in one direction (e.g., commuter parking garages that take in vehicles in the morning and discharge them in the afternoon).

Storage

The total number of vehicles a link can hold at any point in time.

Sub-Network

A CORSIM network can consist of either a freeway sub-network, a surface-street sub-network, or both.

Surface Street

A non-freeway roadway representative of the streets within a city or town. Surface streets may connect at intersections and be controlled by traffic signals. Within the CORSIM simulation, surface-street links and their operational characteristics are specified separately from freeway links. In TRAFVU, surface-street links are colored black.

Thumb

A thumb is the rectangular button in a scroll bar that can be moved to scroll the contents of the window to which the scroll bar is attached.

TID File

Time interval data file. A file that contains the time interval-dependent MOE generated by the simulation and used as input to TRAFVU.

TII File

Time interval index file. A file that contains indexes used by TRAFVU to search the tid file by time interval.

Time Interval

A unit of time at which the simulation model (CORSIM) reports Measures of Effectiveness (MOE).

Time Period

A unit of time for which the exogenous input data remain constant for the simulation. Each simulation run is partitioned into a series of time periods of varying duration.

Time Step

The smallest unit of time at which the simulation model (CORSIM) reports information. The time step is typically one second. CORSIM reports vehicle positions, signal states, and controller information at each time step.

Time-Space Diagram

A two-dimensional diagram that indicates intersection locations on one axis and time along the other axis. For a specified speed, it maps the progression of the green time (band) for signals along a roadway (artery). It is used as an aid in setting the timing of signals along an artery.

Tool Tip

A small rectangular pop-up window that displays a brief description of a command bar (tool bar) button's purpose.

TRAFED

TRAF Editor. A graphical input editor used to define traffic networks and other input for simulation. It is part of the TSIS suite of tools.

TRAFVU

TRAF Visualization Utility. A graphics processor used to display traffic networks and animate vehicles and signals on that network. It is part of the TSIS suite of tools.

TReL

Traffic Research Laboratory. A traffic research facility maintained by FHWA at its Turner-Fairbank Highway Research Center.

Trf File

A file that contains the input data used to define a CORSIM network and to drive the CORSIM simulation for a single simulation case.

Tsd File

Time step data file. A file that contains the time step-dependent vehicle and signal state information generated by the simulation and used as input to TRAFVU.

Tsi File

Time step index file. A file that contains indexes used by TRAFVU to search the tsd file by time step.

TSIS

Traffic Software Integrated System. TSIS is the integrated development environment that hosts the CORSIM simulation and its support tools.

Unprotected Bus Station

A bus station that does not have its own pull-out lane, thus blocking traffic while loading or unloading.

Vehicle Detail

TRAFVU displays vehicles as rectangles. However, TRAFVU supports two higher levels of detail. Enhanced Rectangles shows hood and door lines to provide a more realistic view of vehicles. Enhanced Rectangles with Lights adds turn signal, brake, and head lights.

Vehicle Flagging

Flagging a vehicle is the process of clicking on a vehicle in TRAFVU to add a flag to the vehicle. Adding a flag enables the user to more easily track the vehicle as it moves through the network.

Warning Sign

In CORSIM a warning sign marks the reaction point for a lane drop, off ramp, or incident. In TRAFVU warning signs are indicated by yellow or orange diamonds on the side of the roadway.

Yield Point

Refers to the end of the sync phase in an actuated controlled intersection. At this point, the sync phases are allowed to yield, if in a permissive period. After sync phase termination, the other phases are served in their normal sequence.

4.2 Measures of Effectiveness (MOE)

4.2.1 Bus Station MOE

Buses Serviced; Total (buses)

Total number of buses (since the end of system initialization) that have stopped at the station to allow passengers to embark/debark.

Capacity Exceeded Time; Total (minutes)

Total number of minutes (since the end of system initialization) that buses were forced to wait to enter the station because the station was already full.

Dwell Time; Total (minutes)

Total number of minutes (since the end of system initialization) accumulated by all buses that have stopped at the station to allow passengers to embark/debark.

Empty Time; Total (minutes)

Total number of minutes (since the end of system initialization) that there were no buses present in the station.

4.2.2 Bus Route MOE

Headway (seconds)

Time between bus emissions on a given route.

Person Travel Time (minutes)

The amount of time spent by all individuals on buses traversing the route since system initialization completed. This estimate assumes an occupancy rate of 25 persons/bus throughout the route.

Person Trips

The number of persons on buses which have completed the route after system initialization concluded.

Travel Time Per Vehicle (seconds/bus)

The average time a bus takes to traverse the entire route.

Travel Time; Total (minutes)

The total travel time accumulated by all buses traversing the route since initialization completed.

Trips; Route

The number of buses which have completed the route after system initialization concluded.

4.2.3 Link MOE

Bus Delay; Total (minutes)

Total time that discharged buses were delayed on the link. Calculated as the difference between the bus travel time and bus move time.

Bus M / T

Ratio of the theoretical move time to the actual travel time for buses on the link. Calculated as the theoretical bus move time divided by the bus total travel time on the link.

Bus Person Trips

Number of persons that have completely traversed the link in a bus. Calculated as the number of bus trips times the average bus occupancy.

Bus Speed; Average (miles/hour)

Average speed at which buses traversed the link. Calculated as the number of bus trips times the length of the link divided by the bus total travel time.

Bus Travel Time; Total (minutes)

Total time that discharged buses spent traversing the link. Travel time for buses on the link is accumulated every time that a bus discharges from the link.

Bus Trips

Number of buses that have completely traversed the link. Bus trips are accumulated every time step.

Buses That Stopped

Number of buses that stopped at least once on the link. Stops are defined as a bus stopping for any reason including buses stopping to dwell at a station.

Content; Average (vehicles)

Average number of vehicles on the link during the evaluation interval. Calculated as the total travel time for all vehicles divided by the duration of the evaluation interval.

Content; Current (vehicles)

A snapshot of the current number of vehicles on the link.

Delay; Control; Per Vehicle (seconds/vehicle)

Average time that a vehicle was delayed due to signals on the link. Calculated as the total control delay divided by the sum of trips and current content. This MOE is computed for surface-street links only.

Delay; Control; Total (minutes)

The total time vehicles are delayed due to signals on the link. It includes initial deceleration delay, queue move-up time, stopped delay and final acceleration delay. The CORSIM User's Guide contains a detailed description of control delay. This MOE is computed for surface-street links only.

Delay; Queue; Per Vehicle (seconds/vehicle)

The average time that a vehicle spent queued on the link. Being queued is defined as having an acceleration of less than 2 feet/second/second. This MOE is computed for surface-street links only.

Delay; Queue; Total (minutes)

For each turn movement, the total time that vehicles spent queued on the link. Being queued is defined as having an acceleration of less than 2 feet/second/second. This MOE is computed for surface-street links only.

Delay; Stop; Per Vehicle (seconds/vehicle)

The average time that a vehicle was stopped on the link. Stop time is defined as any time that a vehicle is stopped on a link including buses in dwell. This MOE is computed for surface-street links only.

Delay; Stop; Total (minutes)

For each turn movement, the total time vehicles were stopped on the link. Stop time is defined as any time that a vehicle is stopped on a link including buses in dwell. This MOE is computed for surface-street links only.

Delay; Travel; Per Vehicle (seconds/vehicle)

For each turn movement, the average time vehicles were delayed on the link. Calculated as the delay time for the turn movement divided by vehicle trips for the turn movement.

Delay; Travel; Total (minutes)

For each turn movement, the total time that all discharged vehicles were delayed on the link. The delay time is the difference between the actual travel time and the travel time if constantly moving at the link free flow speed. The delay time not only includes increased travel time from reduced speed but also time added due to traffic control.

Density; Per Lane (vehicles/mile/lane)

Average number of vehicles per mile per lane. Calculated as the average content divided by the link area. Link area is the sum of the lengths of the lanes in the link. This MOE is computed for freeway links only.

Emissions Rate (kg/mile-hour)

The emission rates for CO, HC, and NOx are calculated as the total emissions for the specified type divided by the duration of the evaluation interval.

Emissions; Total (grams/mile)

The total emissions per mile produced by all vehicles on the link. Separate emissions counts are collected for CO, HC, and NOx.

Fuel Consumption; Total (gallons)

For each vehicle fleet (automobile, truck, bus, and carpool), the number of gallons of fuel consumed on the link during the evaluation interval.

Lane Changes; Total

Cumulative number of lane changes completed by vehicles on the link.

M / T

For each turn movement, the fraction of the total travel time that vehicles on the link were moving. Calculated as the total move time divided by the total travel time for each turn movement.

Move Time; Total (minutes)

For each turn movement, the total theoretical time for discharged vehicles to travel the length of the link if moving unimpeded at the free-flow speed. Calculated as the total travel distance divided by the free-flow speed on the link.

Person Delay; Total (minutes)

Total delay to persons completely traversing the link in a vehicle. Calculated as the total person travel time minus the total person travel distance divided by the free flow speed on the link. This MOE is computed for surface-street links only.

Person Trips (person-trips)

Total number of people completely traversing the link in vehicles. Calculated as vehicle trips times the average number of people per vehicle for the link. This MOE is computed for surface-street links only.

Phase Failures; Total

Total number of phase failures on the link. A phase failure occurs when vehicles queued on a link are not all discharged in one cycle during the phase serving the link. This MOE is computed for surface-street links only.

Queue by Lane; Average (vehicles)

The average number of queued vehicles in each lane on a link during the evaluation interval. This MOE is computed for surface-street links only.

Queue by Lane; Maximum (vehicles)

The largest number of queued vehicles in each lane on a link during the evaluation interval. This MOE is computed for surface-street links only.

Speed; Average (miles/hour)

For each turn movement, the average speed of a vehicle that has completely traversed the link. Calculated as the total travel distance divided by the total travel time for the turn movement.

Stopped Vehicles

Number of discharged vehicles that stopped at least once on the link. This MOE is computed for surface-street links only.

Stopped Vehicles; Percent (%)

Percentage of vehicles that have completely traversed the link that were forced to stop as least once while on the link. Calculated as the total number of stopped vehicles divided by the vehicle trips for the link. This MOE is computed for surface-street links only.

Storage; Percent (%)

Average percentage of the link length that vehicles occupied. Calculated as the average content times the average vehicle length divided by the sum of the lengths of the lanes on the link. This MOE is computed for surface-street links only.

Travel Distance; Total (miles)

For each turn movement, the total distance traveled by vehicles on the link. Accumulated during the evaluation interval and adjusted for vehicles entering the link via a right turn.

Travel Time; Per Vehicle (seconds/vehicle)

For each turn movement, average travel time for a vehicle to traverse the link. Calculated as the total travel time for the specified turn movement divided by the vehicle trips for the specified turn movement.

Travel Time; Total (minutes)

For each turn movement, the total time that all discharged vehicles were on the link. Accumulated during the evaluation interval when a vehicle exits the link.

Trips

For each turn movement, the total number of vehicles that have completely traversed the link. One-half vehicle trip is recorded when:

- A vehicle exits the link into a sink node.
- A vehicle that enters the link from a source node, discharges from the link.

This MOE is computed for surface-street links only.

Vehicles Discharged (vehicles)

For each turn movement, the total number of vehicles discharged from the link (including source vehicles). Accumulated during the evaluation interval when a vehicle exits the link.

Volume (vehicles/hour)

Average number of vehicles traversing the link, converted to an hourly value. Calculated as the vehicle trips divided by the duration of the evaluation interval. For example, if 25 vehicles discharged a link in a 15 minute interval, the volume on the link is 100 vehicles/hour. This MOE is computed for surface-street links only.

Volume; Per Lane (vehicles/hour/lane)

Average number of vehicles traversing each lane, converted to an hourly value. Calculated as the density times the average speed. For example, if 25 vehicles discharged a link, with 2 lanes, in 15 minutes of simulation time, the volume is 50 vehicles/hour/lane. This MOE is computed for freeway links only.

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